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BRIDGES' FOOD AND BEVERAGE ANALYSES

BY

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THIRD EDITION, THOROUGHLY REVISED

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TO

MARIE T. BRIDGES

"Now go, write it before them in a table, and note it in a book, that it may be for the time to come for ever and ever."

Isaiah 30:8

PREFACE TO THE THIRD EDITION.

RAPID advance in the field of human nutrition has expanded the need for comparative data covering both a wide variety of foods and a considerable list of specific food factors. Such data, although far from complete, already reach staggering proportions and interpretation thereof becomes more complex with increasing comprehension of the numerous chemical agents responsible for growth and maintenance of normal health.

The tables presented in this book and accompanying comments are designed to aid those interested in nutrition in evaluating food from as many angles as possible. The rôle of food in home, school, hospital or other institution is being stressed as never before. Readily accessible data are desirable from both the practical and academic standpoint.

To modernize the third edition of this volume, considerable rearrangement was undertaken so as to emphasize changing points of view. This has necessitated a completely different approach from that of classical biochemistry. Full understanding of the altered perspective is essential to the best use of the various tables. New chapters, then, have been added and old ones removed. The vitamin section has undergone extensive enlargement and review. Careful consideration is also given to the effect of processing upon nutritive values.

The question of goitrogenic foods is introduced and the mineral section is further enhanced by sodium and potassium analyses on approximately 500 foods and 150 municipal water supplies, as determined by the flame photometer. Appreciation is expressed to Dr. Charles E. Bills and his associates for permission to use these figures.

Credit also is due to Miss Elizabeth F. Carr, Archibald Church Library, Northwestern University, for noteworthy aid in literature perusal and to Miss Frances E. Glaeser and her staff at the Los Angeles County Medical Library for placing their facilities at the disposal of the author.

M.R.M.

LOS ANGELES

PREFACE TO THE FIRST EDITION.

The material contained within these covers, it seems to the author and his associates, will fill an hiatus in the armamentarium of all those interested in nutrition.

Many years have elapsed since the publication of Bulletin 28 of the Department of Agriculture containing that epochal work of Atwater and Bryant which has become a source for all studies and treatises on nutrition in the western world. A study of the various food analytical tables published since then reveals that little, or no original investigation has been done and that they are merely readaptations, often inaccurate, of this early work.

Notwithstanding the ever-increasing use by the public of canned and packaged foods, very little dietetic recognition has been given to these products, and their analyses heretofore have been available only through contact with the manufacturers. Their use has become so general that it is impractical and archaic to insist solely upon fresh and non-commercial products.

It would seem necessary to have available the analyses of these products, in addition to those of common foods in order to prescribe a proper dietary. This volume is, therefore, offered to meet this requirement.

The material presented herein is the result of the intensive efforts of a large staff of assistants and other investigators who have thoroughly searched international records in order to correlate and evaluate present available international data. Where such data on common foods were lacking, original analyses were made and the results embodied.

Analyses of internationally recognized commercial products have been obtained from the respective manufacturers.

All of this has consumed considerable time, labor and expense, and was made possible, in part, through the generosity of the Life Extension Institute and through a gift from William A. Schutz and family in memory of Hazel V. Mitchell.

This material has been assembled under the direction of the author, with the invaluable assistance of Marjorie R. Mattice, Assistant Professor of Biochemistry of the New York Post-Graduate Medical School, Columbia University. Miss Mattice is principally responsible for the assembling, checking, correlating and correcting of the various data and for the many original analyses.

M. A. Bridges.

New York City.

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FOOD AND BEVERAGE ANALYSES.

INTRODUCTION.

Attention is focussed as never before upon the needs of the human body to the end that abundant health may be realized by the masses. The foundations of nutritional science have been securely laid by innumerable investigators and the application of that knowledge is now possible. The daily requisites of the various food factors can be estimated with more or less certainty, thus providing a crude yardstick whereby the nutritional status of an individual may be ascertained. The tables provided in this book are intended to aid in analyzing any diet and compounding one more suitable when indicated.

It should be recognized, of course, that no two samples of the same foodstuff are necessarily identical in composition. It is not permissible, therefore, to list all the food consumed in a day, to set down against each item the "elements" therein as found in the appended tables, and to arrive at a total with the accuracy of a banker's ledger. The sum is a relative value which merely indicates the approximate intake. These approximations may vary considerably from reality, especially where it is necessary to employ analyses of raw products for estimating their composition when cooked.

Since many variables alter the precise requirement to a measurable degree, any general statement can hope to attain accuracy only if it can be assumed that average normal conditions exist.

ESTIMATED AVERAGE NORMAL DAILY REQUIREMENT OF FOOD FACTORS

Carbohydrates	
Adults:	350–450 g.
Fiber	
Adults:	min. 100 mg. per kilo
Proteins	
Growing children:	2–4 g. per kilo
Adults:	1 g. per kilo
Fats	
Infants:	4 g. per kilo
Children:	3 g. per kilo
Adults:	50 g. on 2500–Calorie diet
	100 g. on 3000–Calorie diet

Calcium	
Children:	1.0–1.4 g.
Adults:	1.0 g.
Phosphorus	
Children:	Equal to calcium
Adults:	1.5 times calcium
Magnesium	
Children, preschool:	11–19 mg. per kilo
Adult:	0.14–0.67 (aver. 0.34) g.
Iron	
Children, preschool:	6–8 mg.
school:	10–15 mg.
Adults:	12 mg.
Copper	
Children:	0.05 mg. per kilo
Adults:	1–2 mg.
Manganese	
Children:	0.2–0.3 mg. per kilo
Chlorides	
Adults:	min. 2 g. NaCl aver. 10 g. NaCl
Sulfur	
Adults:	0.5–2.8 (aver. 1.3) g.
Iodine	
Children:	0.002–0.004 mg. per kilo
Adolescents:	upper values
Adults:	0.15–0.30 mg.
Pregnant or lactating:	upper values
Vitamin A	
Infants:	1500 I.U.
Children:	2000–6000 I.U.
Adults:	5000 I.U.
Thiamine, Vitamin B_1	
Infants:	0.4 mg.
Growing children:	0.6–1.7 mg.
Adults:	1.0–2.0 mg.
Riboflavin, Vitamin B_2	
Infants:	0.6 mg.
Children:	0.9–2.5 mg.
Adults, men:	1.8 mg.
Women:	1.5 mg.

Nicotinic Acid

Infants:	4 mg.
Children, preschool:	6–8 mg.
School:	10–17 mg.
Adults, men:	12–18 mg.
Women:	10–15 mg.

Ascorbic Acid, Vitamin C

Infants:	30 mg.
Children:	35–100 mg.
Adults, men:	75 mg.
Women:	70 mg.

Vitamin D

Infants:	400 U.S.P. units*
Children:	400 U.S.P. units*
Adults:	unknown

Caloric requirements are considered elsewhere, p. 18.

* Plus ample calcium and phosphorus.

Normal Requirements.—In addition to the foregoing arrangement the tabulation of the National Research Council follows. This nutritional standard has come to be known as the "Yardstick." It should be stressed that this features desirable, not minimum, levels and represents the considered opinion of American experts. Divergent opinions exist and further experimental study will lead to periodic revision.

TABLE 1.—RECOMMENDED DIETARY ALLOWANCES, REVISED 1948
(AMOUNTS PER DAY)
Food and Nutrition Board, National Research Council

	Calories[1]	Protein grams	Calcium grams	Iron mg.	Vitamin A I. U.[2]	Thiamine mg.[3]	Riboflavin mg.[3]	Niacin (Nicotinic acid) mg.[3]	Ascorbic acid mg.	Vitamin D I. U.
Man (154 lb., 70 kg.)										
Sedentary	2400	70	1.0	12[4]	5000	1.2	1.8	12	75	[5]
Physically active	3000	70	1.0	12[4]	5000	1.5	1.8	15	75	[5]
With heavy work	4500	70	1.0	12[4]	5000	1.8	1.8	18	75	[5]
Woman (123 lb., 56 kg.)										
Sedentary	2000	60	1.0	12	5000	1.1	1.5	10	70	[5]
Moderately active	2400	60	1.0	12	5000	1.2	1.5	12	70	[5]
Very active	3000	60	1.0	12	5000	1.5	1.5	15	70	[5]
Pregnancy (latter half)	2400[6]	85	1.5	15	6000	1.5	2.5	15	100	400
Lactation	3000	100	2.0	15	8000	1.5	3.0	15	150	400
Children up to 12 yrs.[7]										
Under 1 yr.[8]	110/2.2 lb. (1 kg.)	3.5/2.2 lb. (1 kg.)	1.0	6	1500	0.4	0.6	4	30	400
1–3 yrs. (27 lb., 12 kg.)	1200	40	1.0	7	2000	0.6	0.9	6	35	400
4–6 yrs. (42 lb., 19 kg.)	1600	50	1.0	8	2500	0.8	1.2	8	50	400
7–9 yrs. (58 lb., 26 kg.)	2000	60	1.0	10	3500	1.0	1.5	10	60	400
10–12 yrs. (78 lb., 35 kg.)	2500	70	1.2	12	4500	1.2	1.8	12	75	400
Children over 12 yrs.[7]										
Girls, 13–15 yrs. (108 lb., 49 kg.)	2600	80	1.3	15	5000	1.3	2.0	13	80	400
16–20 yrs. (122 lb., 55 kg.)	2400	75	1.0	15	5000	1.2	1.8	12	80	400
Boys, 13–15 yrs. (108 lb., 49 kg.)	3200	85	1.4	15	5000	1.5	2.0	15	90	400
16–20 yrs. (141 lb., 64 kg.)	3800	100	1.4	15	6000	1.7	2.5	17	100	400

*Tentative goal toward which to aim in planning practical dietaries: The recommended allowances can be attained with a good variety of common foods which also provide other minerals and vitamins for which requirements are less well known.

[1]Calorie allowances must be adjusted up or down to meet specific needs. The calorie values in the table are therefore not applicable to all individuals but rather represent group averages. The proper calorie allowance is that which over an extended period will maintain body weight or rate of growth at the level most conducive to well-being.

[2]The allowance depends on the relative amounts of vitamin A and carotene. The allowances of the table are based on the premise that approximately two-thirds of the vitamin A value of the average diet in this country is contributed by carotene and that carotene has half or less than half the value of vitamin A.

[3]For adults (except pregnant and lactating women) receiving diets supplying 2,000 calories or less, such as reducing diets, the allowances of thiamine, and niacin may be 1 mg., and 10 mg. respectively. The fact that figures are given for different calorie levels for thiamine and niacin does not imply that we can estimate the requirement of these factors within 500 calories, but they are added merely for simplicity of calculation. In the present revision, riboflavin allowances are based on body weight rather than caloric levels. Other members of the B complex also are required, though no values can be given. Foods supplying adequate thiamine, riboflavin, and niacin will tend to supply sufficient of the remaining B vitamins.

[4]There is evidence that the male adult needs relatively little iron. The need will usually be provided for if the diet is satisfactory in other respects.

[5]The need for supplemental vitamin D by vigorous adults leading a normal life seems to be minimum. For persons working at night and for nuns and others whose habits shield them from the sunlight, as well as for elderly persons, the ingestion of small amounts of vitamin D is desirable.

[6]During the latter part of pregnancy the calorie allowance should increase approximately 20 per cent over the preceding level. The value of 2400 calories represents the allowance for pregnant, sedentary women.

[7]Allowances for children are based on the needs for the middle year in each group (as 2, 5, 8, etc.) and are for moderate activity and for average weight at the middle year of the age group.

[8]Needs of infants increase from month to month with size and activity. The amounts given are for approximately 6 to 8 months. The dietary requirements for some of the nutrients such as protein and calcium are less if derived largely from human milk.

Further recommendations:

Fat.—There is available little information concerning the human requirement for fat. Fat allowances must be based at present more on food habits than on physiological requirements. While a requirement for certain unsaturated fatty acids (the linoleic and arachidonic acids of natural fats) has been amply demonstrated with experimental animals, the human need for these fatty acids is not known. In spite of the paucity of information on this subject there are several factors which make it desirable (1) that fat be included in the diet to the extent of at least 20 to 25 percent of the total calories and (2) that the fat intake include "essential" unsaturated fatty acids to the extent of at least 1 percent of the total calories. At higher levels of caloric expenditure, e.g., for a very active person consuming 4500 calories and for children and adolescent persons, it is desirable that 30 to 35 percent of the total calories be derived from fat. Since foodstuffs such as meat, milk, cheese, nuts, etc., contribute fat to the diet, it is necessary to use separated or "visible" fats such as butter, oleomargarine, lard or shortenings only to supply one-third to one-half the amounts indicated.

Water.—A suitable allowance of water for adults is 2.5 liters daily in most instances. An ordinary standard for diverse persons is one milliliter for each calorie of food. Most of this quantity is contained in prepared foods. At work or in hot weather, requirements may reach 5 to 13 liters daily. Water should be allowed *ad libitum*, since sensations of thirst usually serve as adequate guides to intake except for infants and sick persons.

Salt.—The needs for salt and for water are closely interrelated. A liberal allowance of sodium chloride for the adult is 5 grams daily, except for some persons who sweat profusely. The average normal intake of salt is 10 to 15 grams daily, an amount which meets the salt requirements for a water intake up to 4 liters daily. When sweating is excessive, one additional gram of salt should be consumed for each liter of water in excess of 4 liters daily. With heavy work or in hot climates 20 to 30 grams daily may be consumed with meals and in drinking water. Even then, most persons do not need more salt than usually occurs in prepared foods. It has been shown that after acclimatization persons produce sweat that contains only about 0.5 gram to the liter in contrast with a content of 2 to 3 grams for sweat of the unacclimatized person. Consequently after acclimatization, need for increase of salt beyond that of ordinary food disappears.

Iodine.—The requirement for iodine is small, probably about 0.002 to 0.004 mg. daily for each kilogram of body weight, or a total of 0.15 to 0.30 mg. daily for the adult. This need is met by the regular use of iodized salt; its use is especially important in *adolescence* and *pregnancy*.

Phosphorus.—Available evidence indicates that the phosphorus allowances should be at least equal to those for calcium in the diets of children and of women during the latter part of pregnancy and during lactation. In the case of other adults the phosphorus allowances should be approximately 1.5 times those for calcium. In general it is safe to assume that if the calcium and protein needs are met through common foods, the phosphorus requirement also will be covered, because the common foods richest in calcium and protein are also the best sources of phosphorus.

Copper.—The requirement for copper for adults is about 1 to 2 mg. daily. Infants and children require approximately 0.05 mg. for each kilogram of body weight. The requirement for copper is approximately one-tenth that for iron. A good diet normally will supply sufficient copper.

Vitamin K.—The requirement for vitamin K usually is satisfied by any good diet, except for the infant *in utero* and for the first few days after birth. Supplemental vitamin K is recommended during the last month of pregnancy. When it has not been given in this manner, it is recommended for the mother preceding delivery or for the baby immediately after birth.

Folic Acid.—Evidence for recognizing folic acid (pteroylglutamic acid, Vitamin Bc, L. casei factor or vitamin M) as an essential human nutrient is currently being considered. The quantitative requirement cannot be closely estimated from evidence now available

ADEQUATE LOW-COST DIETS.

Booher (*Jour. Am. Med. Assn.*, **114**, 548, 1940) presents tabulated data showing the allowance of major food groups which will provide the nutritive essentials for persons at different age levels for a period of one year at a relatively low cost. Assuming the family to consist of "one moderately active man, one moderately active woman, a five-year-old daughter and an eight-year-old son, this family's food requirements could be adequately met by weekly supplies of the kinds and quantities of foods (shown separately for each member of the family) indicated in Table 2. These weekly allowances of food provide for the approximate daily intake of calories, protein, fat and carbohydrate as well as certain minerals and vitamins in the quantities shown in Table 3.

Table 2.—**A Good Low-Cost Diet: Approximate Quantities Needed for One Week for Specified Individuals.***

	Unit of measure.	Moderately active man, quantity.	Moderately active woman, quantity.	Boy 8 years, quantity.	Girl 5 years, quantity.
Flour, cereal†	Pound	4½	3½	2¾	2
Milk (or its equivalent)	Quart	3½	3½	5	7
Potatoes, sweet potatoes	Pound	3	2¾	2¼	2
Dried legumes, nuts	Ounce	6	4	3	2
Tomatoes, citrus fruits	Pound	1¼	1¼	1¼	1¼
Leafy, green and yellow vegetables	Pound	3	3½	3½	2½
Dried fruits	Pound	¼	¼	⅛	⅛
Other vegetables and fruits	Pound	2	1¾	1¼	¾
Butter	Ounce	6	6	6	4
Other fats	Ounce	10	6	1	..
Sugars	Pound	1¼	1	½	¼
Lean meat, poultry, fish	Pound	2½	1¾	1¼	½
Eggs	Number	3	4	5	5

* Based on the Yearbook of Agriculture, 1939, page 338.

† Count as 1 pound of flour each 1⅓ pounds of bread purchased.

Table 3.—**A Good Low-Cost Diet: Approximate Nutritive Values Daily for Specified Individuals.***

	Unit of measure.	Moderately active man.	Moderately active woman.	Boy, 8 years.	Girl, 5 years.
Food energy value	Calories	3070	2510	2130	1750
Protein	Grams	95	78	76	66
Fats	Grams	117	94	82	68
Carbohydrates	Grams	409	338	271	214
Calcium	Grams	0.92	0.88	1.10	1.36
Phosphorus	Grams	1.54	1.33	1.42	1.40
Iron	Milligrams	15.4	19.3	12.3	9.4
Vitamin A	Int. units†	9000	9600	9500	7700
Vitamin B_1	Int. units†	610	530	500	440
Ascorbic acid	Milligrams	80	80	70	60
Riboflavin	Sherman units	720	660	730	800

* Adapted from Yearbook of Agriculture, 1939, page 338.

† International units.

TABLE 4.—**A Good Low-Cost Diet.***

Kinds and quantities of foods for a year

Family members	Milk (quarts)	Potatoes, sweet potatoes (pounds)	Tomatoes, citrus fruits (pounds)	Leafy, green, yellow vegetables (pounds)	Mature dry legumes, nuts (pounds)	Other vegetables, fruits (pounds)	Eggs (dozen)	Lean meat, poultry, fish (pounds)	Flour, cereals (pounds)	Butter (pounds)	Other fats (pounds)	Sugar (pounds)
Children under 2 years	260	80	65	80	..	...	18	...	50	7	..	3
Children 2 to 3 years	365	90	65	130	..	40	22	15	80	10	..	7
Boys:												
4 to 6 years	365	100	65	130	7	75	22	25	100	15		15
7 to 8 years	260–365	120	65	180	10	100	22	65	140	20	3	25
9 to 10 years	260–365	130	65	200	10	140	18	80	160	20	20	40
11 to 12 years	260–365	140	65	200	15	140	18	90	180	20	20	40
13 to 15 years	260–365	160	65	160	15	175	18	100	230	20	30	50
16 to 19 years	260–365	220	65	160	15	175	13	140	310	20	40	65
Girls:												
4 to 7 years	365	100	65	130	7	75	22	25	100	15	.	15
8 to 10 years	260–365	120	65	180	10	100	22	65	140	20	3	25
11 to 13 years	260–365	130	65	200	10	140	18	80	160	20	20	40
14 to 19 years	260–365	140	65	200	15	140	18	90	180	20	20	40
Men 20 years and over:												
Very active	180	300	65	160	25	175	13	160	420	20	60	80
Moderately active	180	160	65	160	20	175	13	130	230	20	30	65
Sedentary	260	140	65	180	10	140	18	90	160	20	20	40
Women 20 years and over:												
Very active	180	160	65	180	15	175	18	100	230	20	30	65
Moderately active	180	140	65	180	15	165	18	90	180	20	20	50
Sedentary	260	100	65	180	10	140	18	90	120	20	20	40
In pregnancy	365	140	65	250	10	200	22	90	170	20	20	40
In lactation	365	170	65	250	10	200	22	100	210	20	30	50
Yearly total for family	...	...	..	...	..	...	..	...	...	..	..	..
Monthly total (divide by 12)	...	...	..	...	..	...	..	...	...	.	..	..
Weekly total (divide by 50)	...	...	..	...	..	...	..	...	...	.	..	..

*From the 1939 Yearbook of Agriculture (Food and Life).

CHAPTER 1.

CALORIC REQUIREMENTS.

The nutritional demands of the body vary with the age, sex, height and weight of the individual and with the sum total of activity during the twenty-four hours. The variations of age are most significant during the growing periods of childhood and youth, and require greater recognition than in the more mature years.

Quoting from Sherman, in his third edition of *Chemistry of Food nad Nutrition*, "The calories per hour, per pound and per kilogram can be most readily determined from the following table:

Form of activity.	Calories per hour		
	Per 70 kilograms.*	Per kilogram.	Per pound.
Sleeping	65	0.93	0.43
Awake lying still	77	1.10	0.50
Sitting at rest	100	1.43	0.65
Reading aloud	105	1.50	0.69
Standing relaxed	105	1.50	0.69
Hand sewing	111	1.59	0.72
Standing at attention	115	1.63	0.74
Knitting (23 stitches per min. on sweater)	116	1.66	0.75
Dressing and undressing	118	1.69	0.76
Singing	122	1.74	0.79
Tailoring	135	1.93	0.88
Typewriting rapidly	140	2.00	0.91
Ironing (with 5-pound iron)	144	2.06	0.93
Dishwashing (plates, bowls, cups and saucers)	144	2.06	0.93
Sweeping bare floor (38 strokes per minute)	169	2.41	1.09
Bookbinding	170	2.43	1.10
"Light exercise"	170	2.43	1.10
Shoemaking	180	2.57	1.17
Walking slowly (2.6 miles per hour)	200	2.86	1.30
Carpentry, metal working, industrial painting	240	3.43	1.56
"Active exercise"	290	4.14	1.88
Walking moderately fast (3.75 miles per hour)	300	4.28	1.95
Stoneworking	400	5.71	2.60
"Severe exercise"	450	6.43	2.92
Sawing wood	480	6.86	3.12
Swimming	500	7.14	3.25
Running (5.3 miles per hour)	570	8.14	3.70
"Very severe exercise"	600	8.57	3.90
Walking very fast (5.3 miles per hour)	650	9.28	4.22

* Average man (150 pounds).

Thus a specific diet regimen may be outlined for individuals or for a group of individuals, based on the various activities in which they indulge during an average twenty-four hour period. The sum of the number of calories per pound required in the various activities of the day will determine the proper caloric maintenance intake.

Having established the number of calories required for maintenance or for the increase or decrease in poundage, a proper balance

of the various elements must be determined and a diet following these principles prescribed.

The average infant requires the following:

1. Basal metabolism (at rest)	55 Cal. per kilo (25 Cal. per lb.)
2. Allowance for milk diet	10 Cal. per kilo (4.5 Cal. per lb.)
3. Allowance for activity	25 Cal. per kilo (11 Cal. per lb.)
4. Allowance for growth	15 Cal. per kilo (7 Cal. per lb.)
5. Allowance for food not utilized . . .	10 Cal. per kilo (4.5 Cal. per lb.)
Total	115 Cal. per kilo (52 Cal. per lb.)

(From Saxl, N. T.: Pediatric Dietetics, Philadelphia, Lea & Febiger, 1937.)

TABLE 5.—Estimated Total Caloric Requirements for Children of Different Ages.*

	Minimal. Basal plus 50 per cent.		Maximum.	
Age, years.	Boys, Calories.	Girls, Calories.	Boys, Calories.	Girls, Calories.
1	900	900	900	900
2	975	960	1,200	1,200
3	1,050	1,040	1,300	1,300
4	1,100	1,050	1,400	1,400
5	1,200	1,125	1,500	1,500
6	1,275	1,200	1,700	1,600
6	1,350	1,275	2,000	1,800
8	1,425	1,325	2,500	2,000
9	1,500	1,375	2,600	2,300
10	1,575	1,425	2,800	2,400
11	1,650	1,500	3,000	2,600
12	1,725	1,560	3,250	2,900
13	1,800	1,610	3,500	3,200
14	1,975	1,650	3,750	3,400
15	2,050	1,680	4,000	3,600

* Talbot, F. B.: The Internal Secretory System and Metabolism, New York and London, D. Appleton & Co., 1928.

Weight Specifications. The ideal weight for different age and sex groups is presented in the following tables. In attaining any average there will always be divergence above and below the accepted norm. There is no justification for an individual who is 5 to 10 per cent above average weight struggling to reach the lower level when the body consistently attempts to gain a higher, fixed point. Too little is known about constitutional factors which exercise control over body weight. Attention is directed to a footnote on page 15 which reads: The proper calorie allowance is that which over an extended period will maintain body weight or rate of growth at the level most conducive to well-being.

The Width-Weight Tables shown later (p. 25-34) have much to recommend their use to the profession, leaving tables 6-9 to the laymen.

TABLE 6.—**Height, Weight and Age.—Boys.**

	Average height, inches.	Average weight, pounds.		Average height, inches.	Average weight, pounds.
Under 1 month .	$21\frac{1}{8}$	$9\frac{1}{8}$	8 mos., under 9 . .	$27\frac{3}{4}$	19
1 mo., under 2 .	$22\frac{1}{2}$	$10\frac{7}{8}$	9 mos., under 10 . .	$28\frac{1}{4}$	$19\frac{5}{8}$
2 mos., under 3 .	$23\frac{5}{8}$	$12\frac{5}{8}$	10 mos., under 11 . .	$28\frac{5}{8}$	$20\frac{1}{4}$
3 mos., under 4 .	$24\frac{1}{2}$	$14\frac{1}{8}$	11 mos., under 12 . .	29	$20\frac{3}{4}$
4 mos., under 5 .	$25\frac{3}{8}$	$15\frac{3}{8}$	1 year	$29\frac{1}{2}$	$21\frac{3}{8}$
5 mos., under 6 .	$26\frac{1}{8}$	$16\frac{1}{4}$	2 years	$33\frac{5}{8}$	$26\frac{5}{8}$
6 mos., under 7 .	$26\frac{3}{4}$	$17\frac{1}{2}$	3 years	$36\frac{5}{8}$	$30\frac{3}{4}$
7 mos., under 8 .	$27\frac{1}{4}$	$18\frac{1}{4}$	4 years	38	34

Height, inches.	5 years.	6 years.	7 years	8 years.	9 years.	10 years.	11 years.	12 years.	13 years.	14 years.
38 . . .	34	34								
39 . . .	35	35								
40 . . .	36	36								
41 . . .	38	38	38							
42 . .	39	39	39	39						
43 . . .	41	41	41	41						
44 . . .	44	44	44	44						
45 . . .	46	46	46	46	46					
46 . . .	47	48	48	48	48					
47 . . .	49	50	50	50	50	50				
48 . . .	..	52	53	53	53	53				
49 . . .	..	55	55	55	55	55	55			
50 . . .	..	57	58	58	58	58	58	58		
51 . . .	..	..	61	61	61	61	61	61		
52 . . .	..	..	63	64	64	64	64	64	64	
53 . . .	..	..	66	67	67	67	67	68	68	
54 . . .	..	..	..	70	70	70	70	71	71	72
55 . . .	..	..	..	72	72	73	73	74	74	74
56 . . .	..	..	..	75	76	77	77	77	78	78
57 . . .	..	..	..	..	79	80	81	81	82	83
58 . . .	..	..	..	..	83	84	84	85	85	86
59 . . .	..	..	..	..	..	87	88	89	89	90
60 . . .	..	..	..	..	..	91	92	92	93	94
61 . . .	..	..	..	..	..	..	95	96	97	99
62 . . .	..	..	..	..	..	..	100	101	102	103
63 . . .	..	..	..	..	..	..	105	106	107	108
64 . . .	..	..	..	..	..	..	..	109	111	113
65 . . .	..	..	..	..	..	..	..	114	117	118
66 . . .	..	..	..	..	..	..	..	..	119	122
67 . . .	..	..	..	..	..	..	..	..	124	128
68 . . .	..	..	..	..	..	..	..	..	..	134
69 . . .	..	..	..	..	..	..	..	..	..	137
70 . . .	..	..	..	..	..	..	..	..	..	143
71 . . .	..	..	..	..	..	..	..	..	..	148

* As prepared by Bird T. Baldwin and Thomas D. Wood, and accepted by The American Medical Association.

TABLE 7.—Height, Weight and Age.—Girls.

	Average height, inches.	Average weight, pounds.		Average height, inches.	Average weight, pounds.
Under 1 month . .	$20\frac{7}{8}$	$8\frac{5}{8}$	8 mos., under 9 . .	$27\frac{1}{4}$	$17\frac{3}{4}$
1 mo., under 2 . .	$21\frac{7}{8}$	$10\frac{1}{8}$	9 mos., under 10 . .	$27\frac{5}{8}$	$18\frac{1}{2}$
2 mos., under 3 .	$23\frac{1}{8}$	$11\frac{3}{4}$	10 mos., under 11 . .	$28\frac{1}{8}$	19
3 mos., under 4 .	24	13	11 mos., under 12 . .	$28\frac{1}{2}$	$19\frac{1}{2}$
4 mos., under 5 .	$24\frac{7}{8}$	$14\frac{1}{4}$	1 year	$28\frac{7}{8}$	20
5 mos., under 6 .	$25\frac{1}{2}$	$15\frac{3}{8}$	2 years	$33\frac{1}{8}$	$25\frac{1}{8}$
6 mos., under 7 .	$26\frac{1}{8}$	$16\frac{1}{4}$	3 years	$36\frac{1}{4}$	$29\frac{1}{2}$
7 mos., under 8 .	$26\frac{3}{4}$	$17\frac{1}{8}$	4 years	38	33

Height, inches.	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 years.	12 years.	13 years.	14 years.
38 . . .	33	33								
39 . . .	34	34								
40 . . .	36	36	36							
41 . . .	37	37	37							
42 . . .	39	39	39							
43 . . .	41	41	41	41						
44 . . .	42	42	42	42						
45 . . .	45	45	45	45	45					
46 . . .	47	47	47	48	48					
47 . . .	49	50	50	50	50	50				
48 . . .	..	52	52	52	52	53	53			
49 . . .	..	54	54	55	55	56	56			
50 . . .	..	56	56	57	58	59	61	62		
51 . . .	..	..	59	60	61	61	63	65		
52 . . .	..	..	63	64	64	64	65	67		
53 . . .	..	..	66	67	67	68	68	69	71	
54 . . .	..	..	..	69	70	70	71	71	73	
55 . . .	..	..	..	72	74	74	74	75	77	78
56 . . .	..	..	..	..	76	78	78	79	81	83
57 . . .	..	..	..	..	80	82	82	82	84	88
58 . . .	..	..	..	..	..	84	86	86	88	93
59 . . .	..	..	..	..	..	87	90	90	92	96
60 . . .	..	..	..	..	..	91	95	95	97	101
61 . . .	..	..	..	..	..	..	99	100	101	105
62 . . .	..	..	..	..	..	..	104	105	106	109
63 . . .	..	..	..	..	..	..	..	110	110	112
64 . . .	..	..	..	..	..	..	..	114	115	117
65 . . .	..	..	..	..	..	..	..	118	120	121
66 . . .	..	..	..	..	..	..	..	..	124	124
67 . . .	..	..	..	..	..	..	..	..	128	130
68 . . .	..	..	..	..	..	..	..	..	131	133
69 . . .	..	..	..	..	..	..	..	..	..	135
70 . . .	..	..	..	..	..	..	..	..	..	136
71 . . .	..	..	..	..	..	..	..	..	..	138

* As prepared by Bird T. Baldwin and Thomas D. Wood, and accepted by The American Medical Association.

Table 8.—**Average Weights of Men With Clothes.**

Age.	5′	5′ 1″	5′ 2″	5′ 3″	5′ 4″	5′ 5″	5′ 6″	5′ 7″	5′ 8″	5′ 9″	5′ 10″	5′ 11″	6′	6′ 1″	6′ 2″	6′ 3″	6′ 4″	6′ 5″
15	107	109	112	115	118	122	126	130	134	138	142	147	152	157	162	167	172	177
16	109	111	114	117	120	124	128	132	136	140	144	149	154	159	164	169	174	179
17	111	113	116	119	122	126	130	134	138	142	146	151	156	161	166	171	176	181
18	113	115	118	121	124	128	132	136	140	144	148	153	158	163	168	173	178	183
19	115	117	120	123	126	130	134	138	142	146	150	155	160	165	170	175	180	185
20	117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	181	186
21	118	120	123	126	130	134	138	141	145	149	153	157	162	167	172	177	182	187
22	119	121	124	127	131	135	139	142	146	150	154	158	163	168	173	178	183	188
23	120	122	125	128	132	136	140	143	147	151	155	159	164	169	175	180	185	190
24	121	123	126	129	133	137	141	144	148	152	156	160	165	171	177	182	187	192
25	122	124	126	129	133	137	141	145	149	153	157	162	167	173	179	184	189	194
26	123	125	127	130	134	138	142	146	150	154	158	163	168	174	180	186	191	196
27	124	126	128	131	134	138	142	146	150	154	158	163	169	175	181	187	192	197
28	125	127	129	132	135	139	143	147	151	155	159	164	170	176	182	188	193	198
29	126	128	130	133	136	140	144	148	152	156	160	165	171	177	183	189	194	199
30	126	128	130	133	136	140	144	148	152	156	161	166	172	178	184	190	196	201
31	127	129	131	134	137	141	145	149	153	157	162	167	173	179	185	191	197	202
32	127	129	131	134	137	141	145	149	154	158	163	168	174	180	186	192	198	203
33	127	129	131	134	137	141	145	149	154	159	164	169	175	181	187	193	199	204
34	128	130	132	135	138	142	146	150	155	160	165	170	176	182	188	194	200	206
35	128	130	132	135	138	142	146	150	155	160	165	170	176	182	189	195	201	207
36	129	131	133	136	139	143	147	151	156	161	166	171	177	183	190	196	202	208
37	129	131	133	136	140	144	148	152	157	162	167	172	178	184	191	197	203	209
38	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	198	204	210
39	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	199	205	211
40	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206	212
41	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	207	213
42	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214
43	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214
44	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
45	135	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
46	134	136	138	141	144	148	152	156	161	166	171	177	183	189	196	203	210	216
47	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
48	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
49	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
50	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
51	[illegible]	[illegible]	[illegible]	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
52	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
53	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
54	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219
55 and over	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219

Actuarial Society of America, "Medical Impairment Study," 1929.

Note.—Deduct 1 inch for shoes and 8 pounds for clothes to determine nude weight.

Table 9.—Average Weights of Women With Clothes.

Age.	4' 8"	4' 9"	4' 10"	4' 11"	5	5' 1"	5' 2"	5' 3"	5' 4"	5' 5"	5' 6"	5' 7"	5' 8"	5' 9"	5' 10"	5' 11"	6
15	101	103	105	106	107	109	112	115	118	122	[illegible]	130	134	[illegible]	141	[illegible]	[illegible]
16	102	104	106	108	109	111	114	117	[illegible]	124	128	132	136	[illegible]	143	[illegible]	[illegible]
17	103	105	107	109	111	113	116	119	122	125	129	133	137	140	144	[illegible]	[illegible]
18	104	106	108	110	112	114	117	120	123	126	130	134	138	141	145	[illegible]	[illegible]
19	105	107	109	111	113	115	118	121	124	127	131	135	[illegible]	142	145	151	[illegible]
20	106	108	110	112	114	116	119	122	125	128	132	136	140	143	147	151	[illegible]
21	107	109	111	113	115	117	120	123	126	129	[illegible]	137	141	144	148	152	[illegible]
22	107	109	111	113	115	117	120	123	126	129	133	137	141	145	149	153	157
23	108	110	112	114	116	118	121	124	127	130	134	138	142	146	150	153	157
24	109	111	113	115	117	119	121	124	127	130	134	138	142	146	150	154	158
25	109	111	113	115	117	119	121	124	128	131	135	139	143	147	151	154	158
26	110	112	114	116	118	120	122	125	128	131	135	139	143	147	151	155	159
27	110	112	114	116	118	120	122	125	129	132	136	140	144	148	152	155	159
28	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	[illegible]	[illegible]
29	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	[illegible]
30	112	114	116	118	120	122	124	127	131	134	138	142	146	150	154	157	161
31	113	115	117	119	121	123	125	128	132	135	139	143	147	151	154	157	161
32	113	115	117	119	121	123	125	128	132	136	140	144	148	152	155	158	162
33	114	116	118	120	122	124	126	129	133	137	141	145	149	153	156	159	[illegible]
34	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
35	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	[illegible]
36	116	118	120	122	124	126	128	131	135	139	143	147	151	155	158	161	164
37	116	118	120	122	124	126	129	132	136	140	144	148	152	156	159	162	[illegible]
38	117	119	121	123	125	127	130	133	137	141	145	149	153	157	160	163	[illegible]
39	118	120	122	124	126	128	131	134	138	142	146	150	154	158	161	164	167
40	119	121	123	125	127	129	132	135	138	142	146	150	154	158	161	164	167
41	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	165	168
42	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	166	[illegible]
43	121	123	125	127	129	131	134	137	140	144	148	152	156	160	163	167	170
44	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
45	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	[illegible]
46	123	125	127	129	131	133	136	139	142	146	150	154	158	162	165	[illegible]	[illegible]
47	123	125	127	129	131	133	136	139	142	146	151	155	159	163	166	[illegible]	[illegible]
48	124	126	128	130	132	134	137	140	143	147	152	156	160	164	167	170	174
49	124	126	128	130	132	134	137	140	143	147	152	156	161	165	168	172	[illegible]
50	125	127	129	131	133	135	138	141	144	148	152	156	161	[illegible]	[illegible]	172	[illegible]
51	125	127	129	131	[illegible]	135	138	141	144	148	152	[illegible]	[illegible]	[illegible]	[illegible]	174	[illegible]
52	125	127	129	131	[illegible]	[illegible]	[illegible]	[illegible]	144	148	152	157	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
53	125	127	129	131	[illegible]	[illegible]	[illegible]	[illegible]	144	148	152	157	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
54	125	127	129	131	[illegible]	[illegible]	[illegible]	[illegible]	144	148	153	[illegible]	[illegible]	[illegible]	171	174	[illegible]
55 and over	125	127	129	131	133	[illegible]	138	141	144	148	153	[illegible]	163	[illegible]	171	174	177

Actuarial Society of America, "Medical Impairment Study," 1929.

Note.—Deduct 1½ inches for shoes and 4 pounds for clothes to determine nude weight.

WIDTH-WEIGHT TABLES.*

Children 1 to 16 Years—Adults 17 to 24 Years.

The publishing of the Width-Weight Tables by H. B. Pryor (1936), is felt by the author of this volume to offer the profession one of the most intelligent tables procurable for the establishing of a proper concept of *expected* weight.

Quoting from Pryor, "Many investigators have shown, however, that 'normal' weight, as determined by the generally accepted standards of average weight for sex, height and age, fails to give adequate information concerning individual nutritional status. . . . Many children and young adults who impress the examiner as being properly nourished appear considerably underweight or overweight when judged by height-weight-age standards.

"Determination of appropriate body weight as an index of nutrition should take into account not only the factors of sex, height, and age but also the nature of the bony framework and the body structure. The individual with large skeletal structure tends to be broad and to have heavy muscle tissues (to support the heavy frame), while the individual with a small skeleton tends to be slender and to have light muscle structure.

". . . Following a study of various body measurements which might be used in indices of body build, the bi-iliac diameter or width of the pelvic crest was selected as the most important and least variable measurement of body width. This measurement is not variable with posture or respiration, and, since the landmarks are definite, it requires no special measuring technique.

"The bi-iliac diameter is best measured from the front with straight-arm sliding calipers pressed firmly against the widest flare of the iliac crest. This measurement when divided by the standing height times 1000 yields the width-length index which expresses width of the body in percentage of standing height or relative width.

"The relationship between relative width of the body (as measured by the width-length index) and body weight was found by mathematical analysis of measurements on 10,000 children and young adults. Data on each person were plotted with unit deviation from the mean width-length index for age and sex as abscissa. Correlations between relative width and weight were found to be different for the various age groups. For the age range 17 to 24 years the correlations and standard deviations were as follows:

Men.	*Women.*
$\gamma = +.343 \pm .032$	$\gamma = +.415 \pm .037$
$\sigma_y = 15.392$	$\sigma_y = 16.616$
$\sigma_x = 7.526$	$\sigma_x = 8.213$

* This material has been reprinted with the generous consent of the author Helen B. Pryor, M.D. and the publisher, Stanford University Press, Stanford University, California.

The regression formula $y = \left(\gamma_{xy} \frac{\sigma_y}{\sigma_x} \right) x$ was applied to express weight deviation in terms of width deviation. When x = the unit deviation from mean width-length index for the age-sex group, y = deviation from mean weight in pounds for height and age referred to the medico-actuarial tables, and γ = the coefficient of correlation between x and y, the values of y are $.70_x$ for men and $.84_x$ for women.

"For ages 6 to 16 years the regression formula applied to data for each age-sex group separately showed the value of y to vary with age. The width-length index becomes relatively less variable compared with weight in younger children.

"Width-weight tables were constructed from this data in such a way as to offer a range of seven *normal* weights for each height and age depending upon the width of the iliac crest. In the tables here provided, the average width of the iliac crest for each age level is shown above the central one of the columns of figures which represent average weight for average height. The central column of figures represents the medico-actuarial table of average weights for age and height. Starting from this central column in each case, the three columns to the right represent, respectively, 5, 7, and 10 per cent heavier than the central column, while those to the left represent, respectively, 5, 7 and 10 per cent lighter than the central column. The bicristal diameters heading the various columns were found by applying the regression formula factors.

"For ages 6 to 16 years, the central column represents the Baldwin-Wood average weights for age and height; and the columns (in order from it) on right side represent, respectively, 7, 10, and 15 per cent lighter (left) and 7, 10, and 15 per cent heavier (right) than the average. Since there is greater variability in physical measurements in the period of rapid growth between 6 and 16 years than in the ages either above or below it, a wider range of width is included in the tables for these years."

It is recognized that the mathematics involved in the elaboration of Tables 10 to 13 is beyond the ready comprehension of the average nutritionist. This fact, however, need deter none from their use since such mathematical knowledge is not required for reading the tables. The data herewith presented is so practical as to render it well worth the inconvenience of the extra physical measurement. The use of these tables, naturally, is denied the average layman. This necessitates retention of the older type of table (Tables 6 to 9) for general purposes. It should be realized, however, that such weights are applicable only to those who approximate the standard average.

Instructions.

The width of the iliac crest is shown in both inches and centimeters, since most instruments for measuring width are calibrated

in centimeters. For height, inches alone are shown, since height is usually measured thereby. Width measurements should be done next to the skin. This is usually possible without completely undressing the patient. The weights recorded are without clothes. For school weighing with clothes, allow 1 pound for heights 38 to 40 inches and 2 pounds for heights above 40 inches.

Children who are extremely tall or extremely short for their chronological ages should be referred to the tables where their heights fall in the middle of the range. For example, if a boy, aged seven years, is average height for age eleven, he often is found to be eleven years broad as well as eleven years tall. His developmental age is ahead of his chronological age. Judging an oversized or undersized child by standards for his developmental age does away with distortion at extremes of height within each age group.

To Use Table.

1. Take age of patient at nearest birthday.
2. Take height at nearest inch.
3. Measure with firm pressure the greatest width at the crest of the ilium, or bi-iliac diameter.
4. In the proper age table, opposite the height measurement and under the bi-iliac diameter measurement, will be found the appropriate weight in pounds for a patient of this body build. (If a bi-iliac diameter measurement falls between two column headings, it is necessary to interpolate.)

   Example: A boy, aged 6 years, is 45 inches tall. His bi-iliac diameter is 16.4 cm. Consequently the appropriate weight for his body build is 40 pounds. Whereas if the same boy had a bi-iliac diameter of 21.6 cm., he should weigh 49 pounds.

   Either sliding or spreading calipers may be used to measure the bi-iliac diameter.

TABLE 10.—WIDTH-WEIGHT FOR BOYS.

Ages: One to Eight Years.

Width of Iliac Crest in Inches and Centimeters

AGE ONE YEAR

Height in inches	4.4	4.6	4.8	5.1	5.4	5.6	5.8
	11.3	11.8	12.2	13.1	14.0	14.4	14.9
26	16	16½	17	18	19	19½	20
27	17	17½	18	19	20	20½	21
28	18	18½	19	20	21	21½	22
29	19	19½	20	21	22	22½	23
30	20	20½	21	22	23	23½	24
31	20¾	21¼	21¾	23	24¼	24¾	25¼
32	21½	22	22¾	24	25¼	25¾	26½
33	23½	24	24¾	26	27¼	27¾	28½

AGE TWO YEARS

Height in inches	4.9	5.1	5.3	5.7	6.1	6.3	6.5
	12.5	13.0	13.5	14.5	15.5	16.0	16.5
30	19¾	20¼	20¾	22	23¼	23¾	[illegible]
31	20¾	21¼	21¾	23	24¼	24¾	[illegible]
32	22½	23	23¾	25	26¼	26¾	[illegible]
33	23½	24	24¾	26	27¼	27¾	[illegible]
34	24¼	25	25¾	27	28¼	29	[illegible]
35	26	26¾	27½	29	30½	31¼	32
36	27	27¾	28½	30	31½	32¼	[illegible]
37	28¾	29¾	30¼	32	33¾	34½	[illegible]

AGE THREE YEARS

Height in inches	5.4	5.7	5.9	6.3	6.7	6.9	7.2
	13.8	14.4	14.9	16.0	17.1	17.6	18.2
33	23½	24	24¾	26	27¼	27¾	28½
34	24¼	25	25¾	27	28¼	29	29¾
35	26	26¼	27½	29	30½	31¼	32
36	28	28¼	29½	31	32½	33¼	34
37	28¾	29¾	30¼	32	33¾	34½	35¼
38	29¾	30½	31¼	33	34¾	35½	36¼
39	31½	32¾	33¼	35	36¾	37¾	38½
40	32½	33½	34¼	36	37¾	38¾	39½

AGE FOUR YEARS

Height in inches	5.8	6.1	6.3	6.75	7.2	7.4	7.7
	14.8	15.5	16.0	17.2	18.4	18.9	19.6
35	26	26¾	27½	29	30½	31¼	32
36	28	28¾	29½	31	32½	33¼	34
37	28¾	29¾	30¼	32	33¾	34½	[illegible]
38	29¾	30½	31¼	33	34¾	35½	[illegible]
39	31½	32¾	33¼	35	36¾	[illegible]	[illegible]
40	32½	33½	34¼	36	37¾	38¾	[illegible]
41	34¼	35½	36¼	38	39¾	40¾	[illegible]
42	35	36	37	39	41	42	43
43	37	38	39	41	43	44	45

AGE FIVE YEARS

Height in inches	6.1	6.4	6.6	7.1	7.6	7.8	8.1
	15.6	16.3	16.8	18.1	19.4	19.9	20.6
37	28¾	29¾	30¼	32	33¾	34½	35¼
38	30½	31½	32¼	34	35¾	36¾	37½
39	31½	32¾	33¼	35	36¾	37¾	38½
40	32½	33½	34¼	36	37¾	38¾	39½
41	34¼	35½	36¼	38	39¾	40¾	41¾
42	35	36	37	39	41	42	43
43	37	38	39	41	43	44	45
44	38¾	39¾	40¾	43	45¼	46¼	47¼
45	40½	41½	42¾	45	47½	48¼	49½

AGE SIX YEARS

Height in inches	5.5	6.1	6.5	7.3	8.1	8.5	9.1
	13.9	15.4	16.4	18.5	20.6	21.6	23.1
38	26	28	29	32	35	36	38
39	27	29	30	33	36	37	39
40	28	30	31	34	37	38	40
41	30	32	33	36	39	40	42
42	31	33	34	37	40	41	43
43	32	34	36	39	41	44	46
44	35	37	38	42	46	47	49
45	37	39	40	44	48	49	51
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	[illegible]
48	42	44	46	50	54	56	58
49	44	47	49	53	57	59	62
50	46	49	51	55	59	61	[illegible]

AGE SEVEN YEARS

Height in inches	5.7	6.3	6.7	7.6	8.5	8.9	9.5
	14.5	16.1	17.1	19.3	21.5	22.5	24.1
41	30	32	33	36	39	40	42
42	31	33	34	37	40	41	43
43	32	34	36	39	41	44	46
44	35	37	38	42	46	47	49
45	37	39	40	44	48	49	51
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	56
48	43	45	47	51	55	57	59
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	51	54	56	61	66	68	71
53	54	57	59	64	69	71	74

AGE EIGHT YEARS

Height in inches	6.0	6.7	7.1	8.0	8.9	9.3	10.0
	15.3	17.0	18.0	20.3	22.6	23.6	25.3
42	31	33	34	37	40	41	43
43	32	34	36	39	41	44	46
44	35	37	38	42	46	47	49
45	37	39	40	44	48	49	51
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	56
48	43	45	47	51	55	57	59
49	44	47	49	53	57	59	[illegible]
50	47	50	51	56	61	[illegible]	[illegible]
51	49	52	54	59	64	[illegible]	[illegible]
52	52	55	57	62	67	[illegible]	[illegible]
53	54	58	60	65	70	[illegible]	[illegible]
54	57	61	[illegible]	68	[illegible]	[illegible]	[illegible]
55	59	[illegible]	65	70	[illegible]	78	[illegible]
56	61	63	67	73	[illegible]	81	[illegible]

WIDTH-WEIGHT FOR BOYS.

Ages: Nine to Fourteen Years.

Width of Iliac Crest in Inches and Centimeters

AGE NINE YEARS

Height in inches	6.5 16.6	7.1 18.1	7.5 19.0	8.3 21.1	9.1 23.2	9.5 24.1	10.1 25.6
45	37	39	40	44	48	49	51
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	56
48	43	45	47	51	55	57	59
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	59	62	65	70	75	78	81
56	62	66	68	74	80	82	86
57	65	69	71	77	83	85	89
58	68	72	75	81	87	90	94

AGE TEN YEARS

Height in inches	6.7 17.0	7.3 18.5	7.6 19.4	8.5 21.6	9.4 23.8	9.7 24.7	10.3 26.2
47	40	43	44	48	52	53	56
48	43	45	47	51	55	57	59
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	60	63	65	71	77	79	82
56	63	67	69	75	81	83	87
57	66	70	72	78	84	86	90
58	69	73	76	82	88	91	95
59	72	76	78	85	92	94	98
60	75	79	82	89	96	99	103

AGE ELEVEN YEARS

Height in inches	7.1 18.1	7.7 19.5	8.0 20.4	8.8 22.3	9.6 24.2	9.9 25.1	10.5 26.5
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	60	63	65	71	77	79	82
56	63	67	69	75	81	83	87
57	66	70	73	79	85	88	92
58	69	73	76	82	88	91	95
59	72	77	79	86	93	95	100
60	76	80	83	90	97	100	104
61	78	83	86	93	100	103	108
62	83	88	91	98	105	108	113
63	87	92	95	103	111	114	119

AGE TWELVE YEARS

Height in inches	7.4 18.8	7.9 20.2	8.3 21.1	9.1 23.1	9.9 25.1	10.3 26.0	10.8 27.4
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	55	59	61	66	71	73	77
54	58	61	64	69	74	77	80
55	60	64	66	72	78	80	84
56	63	67	69	75	81	83	87
57	66	70	73	79	85	88	92
58	70	74	77	83	89	92	96
59	73	78	80	87	94	96	101
60	76	80	83	90	97	100	104
61	79	84	87	94	101	104	109
62	83	88	92	99	106	110	115
63	88	93	96	104	112	115	120
64	90	96	99	107	115	118	124
65	95	100	104	112	120	124	129

AGE THIRTEEN YEARS

Height in inches	7.6 19.2	8.2 20.7	8.5 21.6	9.3 23.6	10.1 25.6	10.4 26.5	11.0 28.0
52	52	55	57	62	67	69	72
53	55	59	61	66	71	73	77
54	58	61	64	69	74	77	80
55	60	64	66	72	78	80	84
56	64	68	70	76	82	84	88
57	67	71	74	80	86	89	93
58	70	74	77	83	89	92	96
59	73	78	80	87	94	96	101
60	77	81	84	91	98	101	105
61	80	85	88	95	102	105	110
62	84	89	92	100	108	111	116
63	89	94	97	105	113	116	121
64	92	98	101	109	117	120	126
65	97	103	106	115	124	127	133
66	99	105	108	117	126	129	135
67	103	109	113	122	131	135	141

AGE FOURTEEN YEARS

Height in inches	8.0 20.3	8.6 21.8	8.9 22.7	9.8 24.9	10.7 27.1	11.0 28.0	11.6 29.5
54	59	62	65	70	75	78	81
55	60	64	66	72	78	80	84
56	64	68	70	76	82	84	88
57	68	72	75	81	87	90	94
58	71	75	78	84	90	93	97
59	74	79	81	88	95	97	102
60	77	82	85	92	99	102	107
61	82	87	90	97	104	107	112
62	85	90	93	101	109	112	117
63	89	95	98	106	114	117	123
64	94	99	103	111	119	123	128
65	98	104	107	116	125	128	134
66	101	107	111	120	129	133	139
67	106	113	117	126	135	139	146
68	111	118	122	132	142	146	153
69	114	121	125	135	145	149	156
70	119	126	131	141	151	156	163
71	123	131	135	146	157	161	169

WIDTH-WEIGHT FOR BOYS.

Ages: Fifteen and Sixteen Years.

Width of Iliac Crest in Inches and Centimeters

AGE FIFTEEN YEARS

Height in inches	8.2 20.7	8.7 22.2	9.1 23.2	10.0 25.4	10.9 27.6	11.3 28.6	11.8 30.1
56	66	70	72	78	84	86	90
57	68	72	75	81	87	90	94
58	72	76	78	85	92	94	98
59	74	79	81	88	95	97	102
60	78	83	86	93	100	103	108
61	83	88	91	98	105	108	113
62	86	91	94	102	110	113	118
63	91	97	100	108	116	119	125
64	95	101	105	113	121	125	131
65	100	106	109	118	127	130	136
66	104	110	114	123	132	136	142
67	108	115	118	128	138	141	148
68	111	118	122	132	142	146	153
69	116	123	127	137	147	151	158
70	120	127	132	142	152	157	164
71	125	133	137	148	159	163	171
72	128	135	140	151	162	167	174
73	131	139	144	155	166	171	179
74	134	142	146	158	170	174	182

AGE SIXTEEN YEARS

Height in inches	8.1 20.6	8.8 22.5	9.3 23.6	10.3 26.2	11.3 28.8	11.8 29.9	12.5 31.1
59	74	79	81	88	95	97	102
60	79	84	87	94	101	104	109
61	85	90	93	101	109	112	117
62	89	94	97	105	113	116	121
63	94	99	103	111	119	123	128
64	97	103	106	115	124	127	133
65	101	107	111	120	129	133	139
66	106	113	117	126	135	139	146
67	111	118	122	132	142	146	153
68	114	121	125	135	145	149	156
69	119	126	131	141	151	156	163
70	121	128	132	143	154	158	165
71	126	133	138	149	160	165	172
72	129	137	142	153	164	169	177
73	134	142	146	158	170	174	182
74	137	145	150	162	174	179	187

TABLE 11.—WIDTH-WEIGHT FOR GIRLS.

Ages: One to Four Years.

Width of Iliac Crest in Inches and Centimeters

AGE ONE YEAR

Height in inches	4.5 11.5	4.7 12.0	4.9 12.4	5.2 13.3	5.5 14.2	5.7 14.6	5.9 15.1
26	15	15½	16	17	18	18½	19
27	16	16½	17	18	19	19½	20
28	17	17½	18	19	20	20½	21
29	18	18½	19	20	21	21½	22
30	19	19½	20	21	22	22½	23
31	20	20½	21	22	23	23½	24
32	20¾	21¼	21¾	23	24¼	24¾	25¼

AGE TWO YEARS

Height in inches	4.9 12.4	5.1 13.0	5.3 13.4	5.6 14.4	6.0 15.4	6.2 15.8	6.4 16.4
30	19	[illegible]	20	21	22	[illegible]	[illegible]
31	[illegible]	[illegible]	21¾	23	24¼	[illegible]	[illegible]
32	21½	22	22¾	24	25¼	[illegible]	[illegible]
33	22½	23	23¾	25	26¼	[illegible]	[illegible]
34	[illegible]	24	24¾	26	27¼	[illegible]	[illegible]
35	25	[illegible]	26½	28	29½	[illegible]	[illegible]
36	27	[illegible]	28½	30	31½	[illegible]	[illegible]
37	28	[illegible]	29½	31	32½	[illegible]	34

AGE THREE YEARS

Height in inches	5.3 13.7	5.6 14.3	5.8 14.8	6.2 15.9	6.6 17.0	6.8 17.5	7.1 18.1
32	22½	23	23¾	25	26¼	26¾	[illegible]
33	23½	24	24¾	26	27¼	27¾	[illegible]
34	24¼	25	25¾	27	28¼	29	[illegible]
35	26	26¾	27½	29	30½	31¼	32
36	27	27¾	28½	30	31½	32¼	[illegible]
37	28	28¾	29½	31	32½	33¼	34
38	29¾	30½	31¼	33	34¾	35½	[illegible]
39	30½	31½	32¼	34	35¾	36½	[illegible]
40	31½	32¾	33¼	35	36¾	37¾	[illegible]

AGE FOUR YEARS

Height in inches	5.9 15.1	6.1 15.6	6.3 16.1	6.8 17.3	7.3 18.5	7.5 19.0	7.7 19.5
35	26	[illegible]	27½	29	30½	[illegible]	32
36	27	[illegible]	28½	30	31½	[illegible]	[illegible]
37	28	[illegible]	29½	31	32½	[illegible]	34
38	[illegible]	[illegible]	31¼	33	34¾	[illegible]	[illegible]
39	[illegible]	[illegible]	32¼	34	35¾	[illegible]	[illegible]
40	[illegible]	[illegible]	34¼	36	37¾	[illegible]	[illegible]
41	[illegible]	[illegible]	35¼	37	38¾	[illegible]	[illegible]
42	[illegible]	[illegible]	37	39	41	[illegible]	[illegible]
43	[illegible]	[illegible]	38	40	42	[illegible]	44

WIDTH-WEIGHT FOR GIRLS

Ages: Five to Ten Years

Width of Iliac Crest in Inches and Centimeters

AGE FIVE YEARS

Height in inches	6.0 15.2	6.2 15.8	6.4 16.4	6.9 17.6	7.4 18.8	7.6 19.4	7.8 20.0
36	28	28¾	29½	31	32½	33¼	34
37	28¾	29¾	30¼	32	33¾	34½	35¼
38	29¾	30½	31¼	33	34¾	35½	36¼
39	30½	31½	32¼	34	35¾	36½	37½
40	32½	33½	34¼	36	37¾	38¾	39½
41	33¼	34¼	35¼	37	38¾	39¾	40¾
42	35	36	37	39	41	42	43
43	37	38	39	41	43	44	45
44	37¾	38¾	39¾	42	44¼	45½	46¼

AGE SIX YEARS

Height in inches	5.5 13.9	6.0 15.3	6.4 16.2	7.2 18.3	8.0 20.4	8.4 21.3	8.9 22.8
38	26	27	28	31	34	35	36
39	26	28	29	32	35	36	38
40	28	30	31	34	37	38	40
41	29	31	32	35	38	39	41
42	31	33	34	37	40	41	43
43	32	34	35	39	41	44	46
44	33	35	37	40	43	45	47
45	36	38	39	43	47	48	50
46	37	40	41	45	49	50	53
47	40	43	44	48	52	53	56
48	42	44	46	50	54	56	58
49	43	46	48	52	56	58	61
50	45	48	50	54	58	60	63

AGE SEVEN YEARS

Height in inches	5.6 14.3	6.3 15.9	6.6 16.8	7.5 19.0	8.4 21.2	8.7 22.1	9.4 23.7
40	28	30	31	34	37	38	40
41	29	31	32	35	38	39	41
42	31	33	34	37	40	41	43
43	32	34	36	39	41	44	46
44	33	35	37	40	43	45	47
45	36	38	39	43	47	48	50
46	37	40	41	45	49	50	53
47	40	43	44	48	52	53	56
48	42	44	46	50	54	56	58
49	44	46	48	52	56	58	61
50	45	48	50	54	58	60	63
51	48	51	52	57	62	63	66
52	51	54	56	61	66	68	71
53	54	57	59	64	69	71	74

AGE EIGHT YEARS

Height in inches	6.0 15.3	6.7 17.0	7.1 18.0	8.0 20.3	8.9 22.6	9.3 23.6	10.0 25.3
43	32	34	36	39	42	44	46
44	33	35	37	40	43	45	47
45	36	38	39	43	47	48	50
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	56
48	42	44	46	50	54	56	58
49	44	47	49	53	57	59	62
50	47	49	51	55	59	61	63
51	49	52	53	58	63	64	67
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	56	60	62	67	72	74	78
55	59	62	65	70	75	78	81

AGE NINE YEARS

Height in inches	6.5 16.6	7.1 18.1	7.5 19.0	8.3 21.1	9.1 23.2	9.5 24.1	10.1 25.6
45	36	38	39	43	47	48	50
46	38	41	42	46	50	51	54
47	40	43	44	48	52	53	56
48	42	44	46	50	54	56	58
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	60	64	66	72	78	80	84
56	62	66	68	74	80	82	86
57	66	70	72	78	84	86	90

AGE TEN YEARS

Height in inches	7.2 18.4	7.7 19.7	8.0 20.4	8.7 22.1	9.4 23.8	9.7 24.5	10.2 25.8
47	40	43	44	48	52	53	56
48	43	45	47	51	55	57	59
49	45	48	50	54	58	60	63
50	48	51	52	57	62	63	67
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	55	59	61	66	71	73	77
54	57	61	63	68	73	75	79
55	60	64	66	72	78	80	84
56	64	68	70	76	82	84	88
57	67	71	74	80	86	89	93
58	69	73	76	82	88	91	95
59	72	75	78	85	92	94	98
60	75	79	82	89	96	99	103

WIDTH-WEIGHT FOR GIRLS

Ages: Eleven to Sixteen Years

Width of Iliac Crest in Inches and Centimeters

AGE ELEVEN YEARS

Height in inches	7.7 19.6	8.2 20.9	8.5 21.6	9.1 23.1	9.7 24.6	10.0 25.4	10.5 26.7
48	43	45	47	51	55	57	59
49	45	48	50	54	58	60	63
50	49	52	54	59	64	66	69
51	51	54	56	61	66	68	71
52	53	56	58	63	68	70	73
53	55	59	61	66	71	73	77
54	58	61	64	69	74	77	80
55	60	64	66	72	78	80	84
56	64	68	70	76	82	84	88
57	67	71	74	80	86	89	93
58	71	75	78	84	90	93	97
59	74	79	81	88	95	97	102
60	78	83	86	93	100	103	108
61	82	87	90	97	104	107	112
62	86	91	94	102	110	113	118

AGE TWELVE YEARS

Height in inches	8.1 20.6	8.5 21.6	8.8 22.3	9.5 24.1	10.2 25.9	10.5 26.6	10.9 27.6
50	50	53	55	60	65	67	70
51	53	56	58	63	68	70	73
52	54	58	60	65	70	72	76
53	56	60	62	67	72	74	78
54	58	61	64	69	74	77	80
55	61	65	67	73	79	81	85
56	65	69	71	77	83	85	89
57	67	71	74	80	86	89	93
58	71	75	78	84	90	93	97
59	74	79	81	88	95	97	102
60	78	83	86	93	100	103	108
61	83	88	91	98	105	108	113
62	87	92	95	103	111	114	119
63	91	97	100	108	116	119	125
64	95	100	104	112	120	124	129
65	98	104	107	116	125	128	134

AGE THIRTEEN YEARS

Height in inches	8.4 21.3	8.9 22.6	9.2 23.3	9.9 25.1	10.6 26.9	10.9 27.6	11.4 28.9
53	58	61	64	69	74	77	80
54	60	63	65	71	77	79	82
55	63	67	69	75	81	83	87
56	66	70	73	79	85	88	92
57	69	73	76	82	88	91	95
58	72	77	79	86	93	95	100
59	76	80	83	90	97	100	104
60	80	85	88	95	102	105	110
61	83	88	92	99	106	110	115
62	88	93	96	104	112	115	120
63	91	97	100	108	116	119	125
64	95	101	105	113	121	125	131
65	100	106	109	118	127	130	136
66	103	109	113	122	131	135	141
67	106	113	117	126	135	139	146
68	109	115	119	129	139	143	149

AGE FOURTEEN YEARS

Height in inches	8.6 21.8	9.1 23.1	9.4 23.9	10.1 25.8	10.8 27.3	11.1 28.1	11.6 29.4
55	64	68	70	76	82	84	88
56	68	72	75	81	87	90	94
57	72	77	79	86	93	95	100
58	77	81	84	91	98	101	105
59	79	84	87	94	101	104	109
60	83	88	92	99	106	110	115
61	87	92	95	103	111	114	119
62	90	96	99	107	115	118	124
63	93	98	102	110	118	122	127
64	97	103	106	115	124	127	133
65	100	106	110	119	128	132	138
66	103	109	113	122	131	135	141
67	108	115	118	128	138	141	148
68	111	117	121	131	141	145	151
69	112	119	123	133	143	147	154
70	113	120	124	134	144	148	155
71	115	122	126	136	146	150	157

AGE FIFTEEN YEARS

Height in inches	8.8 22.3	9.3 23.6	9.6 24.4	10.3 26.2	11.0 28.0	11.3 28.8	11.8 30.0
57	76	80	83	90	97	100	104
58	79	84	87	94	101	104	109
59	83	88	91	98	105	108	113
60	87	92	95	104	111	114	119
61	89	95	98	106	114	117	124
62	94	99	103	111	119	123	128
63	[illegible]	102	105	114	123	126	132
64	[illegible]	105	108	117	126	129	135
65	101	107	111	120	129	133	139
66	104	110	114	123	132	136	147
67	[illegible]	115	116	[illegible]	139	143	149
68	[illegible]	119	[illegible]	[illegible]	143	147	154
69	[illegible]	121	[illegible]	[illegible]	145	149	156
70	[illegible]	122	[illegible]	[illegible]	146	150	157
71	[illegible]	124	[illegible]	[illegible]	148	152	159

AGE SIXTEEN YEARS

Height in Inches	9.0 22.9	9.5 24.1	9.8 24.9	10.5 26.6	11.2 28.4	11.5 29.2	12.0 30.5
58	83	88	92	99	106	110	115
59	85	90	[illegible]	101	109	112	117
60	89	95	98	106	114	117	123
61	93	98	102	110	118	122	127
62	95	101	105	113	121	125	131
63	97	103	[illegible]	115	124	127	[illegible]
64	100	106	[illegible]	118	127	130	[illegible]
65	102	108	112	121	[illegible]	134	140
66	[illegible]	113	117	126	[illegible]	[illegible]	146
67	[illegible]	117	[illegible]	131	[illegible]	142	[illegible]
68	[illegible]	120	[illegible]	134	144	148	[illegible]
69	[illegible]	122	[illegible]	136	146	150	[illegible]
70	[illegible]	124	128	138	148	[illegible]	159
71	118	125	130	140	150	[illegible]	[illegible]

Table 12.—WIDTH-WEIGHT FOR MEN

Ages: Seventeen to Twenty-four Years

Width of Iliac Crest in Inches and Centimeters

AGE SEVENTEEN YEARS

Height in inches	9.2	9.6	10.0	10.7	11.4	11.8	12.2
	23.4	24.5	25.3	27.2	29.1	29.9	31.0
61	93	97	99	104	109	111	115
62	98	101	103	109	114	116	120
63	102	106	108	114	120	122	126
64	107	111	113	119	125	127	131
65	112	116	119	125	131	134	138
66	117	121	124	130	136	139	143
67	120	125	127	134	141	143	148
68	125	129	132	139	146	149	153
69	129	133	136	143	150	153	157
70	132	137	139	147	155	157	162
71	136	140	143	151	159	162	166
72	139	144	147	155	163	166	171
73	144	149	152	160	188	171	176
74	149	154	157	166	175	178	183

AGE EIGHTEEN YEARS

Height in inches	9.5	10.0	10.2	11.0	11.8	12.0	12.5
	24.1	25.3	26.0	28.0	30.0	30.7	31.9
62	102	106	108	114	120	122	126
63	107	111	113	119	125	127	131
64	111	115	118	124	130	133	137
65	116	120	122	129	136	138	142
66	120	125	127	134	141	143	148
67	124	128	131	138	145	148	152
68	128	132	135	142	149	152	156
69	131	136	139	146	153	156	161
70	135	139	142	150	158	161	165
71	138	143	146	154	162	165	170
72	142	147	150	158	166	169	174
73	146	151	154	162	170	173	178
74	151	156	159	168	177	180	185

AGE: NINETEEN TO TWENTY YEARS

Height in inches	9.6	10.1	10.4	11.2	12.0	12.3	12.8
	24.4	25.6	26.4	28.4	30.4	31.2	32.4
63	111	115	118	124	130	133	137
64	115	119	121	128	135	137	141
65	119	123	125	132	139	141	145
66	122	127	129	136	143	145	150
67	126	130	133	140	147	150	154
68	130	135	138	145	152	155	160
69	134	138	141	149	157	160	164
70	138	142	145	153	161	164	168
71	141	146	149	157	165	168	173
72	145	150	153	161	169	172	177
73	148	153	156	165	174	177	182
74	152	157	160	169	178	181	186
75	156	162	166	174	182	186	192

AGE: TWENTY-ONE TO TWENTY-FOUR YEARS

Height in inches	9.8	10.3	10.6	11.4	12.2	12.5	13.0
	24.9	26.2	27.0	29.0	31.0	31.8	33.1
63	114	118	121	127	133	136	144
64	118	122	124	131	138	140	149
65	121	125	128	135	142	145	143
66	125	129	132	139	146	149	156
67	128	132	135	142	149	152	151
68	131	136	139	146	153	156	165
69	135	139	142	150	158	161	160
70	138	143	146	154	162	165	174
71	142	147	150	158	166	169	170
72	146	151	155	163	171	175	185
73	151	156	159	168	177	180	181
74	155	160	164	173	182	186	196
75	160	165	168	178	188	191	190

Table 13.—WIDTH-WEIGHT FOR WOMEN

Ages: Seventeen to Twenty-four Years

Width of Iliac Crest in Inches and Centimeters

AGE SEVENTEEN YEARS

Height in inches	9.5 24.1	9.8 25.1	10.1 25.8	10.8 27.4	11.4 29.0	11.7 29.7	12.0 30.7
59	93	96	98	103	108	110	113
60	96	99	102	107	112	115	118
61	100	103	105	111	117	119	122
62	102	106	108	114	120	122	126
63	105	109	111	117	123	125	129
64	108	112	114	120	126	128	132
65	111	115	118	124	130	133	137
66	115	119	122	128	134	137	141
67	119	123	125	132	139	141	145
68	122	126	129	136	143	146	150
69	125	129	132	139	146	149	153
70	127	131	134	141	148	151	155
71	129	134	137	144	151	154	159

AGE EIGHTEEN YEARS

Height in inches	9.6 24.4	10.0 25.4	10.2 26.1	10.9 27.7	11.6 29.3	11.8 30.0	12.2 31.0
60	99	102	104	110	116	118	121
61	102	105	107	113	119	121	124
62	104	108	110	116	122	124	128
63	107	111	113	119	125	127	131
64	109	112	115	121	127	129	[illegible]
65	112	116	119	125	131	134	137
66	116	120	122	129	136	138	142
67	120	124	126	133	140	142	146
68	123	127	130	137	144	146	151
69	127	131	134	141	148	151	155
70	129	134	137	144	151	154	159
71	132	137	139	147	155	157	162

AGE: NINETEEN TO TWENTY YEARS

Height in inches	9.7 24.6	10.0 25.6	10.2 26.3	11.0 28.3	11.8 29.7	12.0 30.4	12.3 31.4
60	102	105	107	113	119	121	124
61	103	107	109	115	121	123	127
62	105	109	111	117	123	125	129
63	109	112	115	121	127	129	133
64	111	115	118	124	130	133	137
65	115	119	121	128	135	137	141
66	118	122	124	131	138	140	144
67	122	126	129	136	143	146	150
68	126	130	133	140	147	150	154
69	129	134	137	144	151	154	159
70	133	138	140	148	156	158	163
71	137	142	144	152	160	162	167

AGE: TWENTY-ONE TO TWENTY-FOUR YEARS

Height in inches	9.8 24.8	10.1 25.8	10.4 26.5	11.1 28.2	11.8 29.9	12.1 30.6	12.4 31.6
60	103	107	109	115	121	123	127
61	105	109	111	117	123	125	129
62	108	112	114	120	126	128	132
63	111	114	117	123	129	132	135
64	114	118	121	127	133	136	140
65	117	121	124	130	136	139	143
66	121	125	128	135	142	145	146
67	125	129	132	139	146	149	153
68	129	133	136	143	150	153	157
69	132	137	139	147	155	157	162
70	136	140	143	151	159	162	166
71	139	144	147	155	163	166	171

CHAPTER 2

THE CALORIC POOL.

ENERGY is required to maintain life and is secured from metabolism of food-stuffs. To achieve this end not only are carbohydrates, proteins and fats necessary but also vitamins and minerals are required in suitable total amounts and relative proportions. From the standpoint of dietetics, the energy content of the daily food intake is computed from the heat equivalent of the carbohydrate, protein and fat components of the diet although it is realized that many other chemical and physiological factors determine how much of this energy the individual is likely to get. It is no longer possible to think in terms of any one factor by itself as its whole effect is influenced by numerous other factors in operation simultaneously. Attention, then, is directed to relative quantities and circumstances of environment both outside and within the body. As time progresses this problem is not simplified, but rather made more difficult both in practice and comprehension.

Carbohydrate does not have a separate metabolic pathway distinct from protein or fat. Each has its own characteristics, its own particular tasks to perform but all converge to a common pool in which chemical units are shared and exchanged. Because of the widespread exchange among common chemical products, either in the process of molecular degradation or manufacture into larger units, carbohydrates, proteins and fats should be considered together insofar as possible, and separated only with respect to their peculiar properties.

Figure 1 shows a much simplified scheme for representing those metabolic pathways which have been investigated. Side reactions branch off from this cycle for further oxidation and ultimate formation of CO_2 and H_2O. To secure the energy locked within the metabolic product, enzymes (protein in character) team up with various B vitamins and minerals to attack derivatives of sugar, amino and fatty acids. To take a few illustrations: pyridoxine functions in amino transfer. Removal of two hydrogen atoms takes place with the aid of riboflavin, nicotinic acid, phosphate and iron. When CO_2 is taken from a carboxyl group (COOH), thiamine, phosphate and magnesium-ion play essential parts. Phosphate is necessary in numerous other intermediary steps.

In countless complex transfers, body constituents and food products continuously interact with each other to maintain the living state. The classical biochemical viewpoint which separated metabolism into exogenous and endogenous phases is no longer tenable. There is no separation into food and tissue metabolism; it is one and the same. Structural "elements" of the cell are not like the walls and furniture of a room but are an intimate part of the activity which

goes on therein, constantly being broken down and built up again. Indeed it is likely that structural proteins, among other things, function as activating agents or enzymes. Nothing is static, everything is involved in a dynamic equilibrium. Chemical units are shuffled time and again, regardless of their source or ultimate destination.

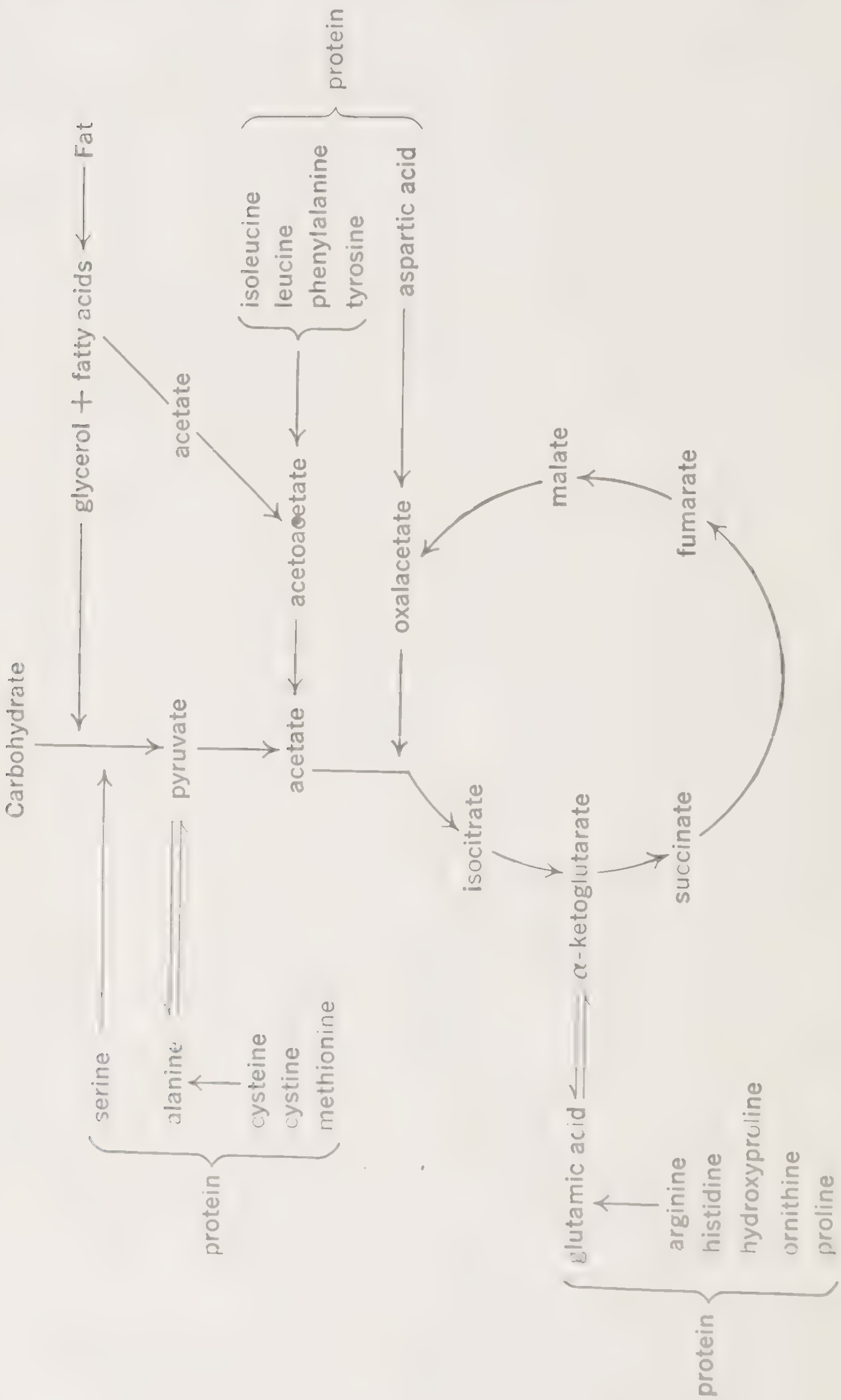

Fig. 1.—The caloric pool.

Fuel Sources.—The body can work with wide differences in relative proportions of carbohydrate, fat and protein but the primary fuel is glucose. Carbohydrate is stored in the body only to a very limited extent—a man weighing 70 kg. has about 1500 calories' worth in his system, enough to last half a day were it the sole source of available energy. The carbohydrate content of each tissue is indispensable to its function apart from its use as a fuel. Many tissues, as brain and heart muscle, are particularly sensitive to a diminished supply of glucose.

A suitable level of liver glycogen is essential to normal function of that organ. The liver controls the proportion of foodstuffs used as fuel. If there is ample carbohydrate, then the liver decreases its activity in removing amino groups from protein products. Protein is not economical as a source of energy since only a part of it can substitute for carbohydrate. Glucose "spares" protein from being used as a fuel. Satisfactory adjustment can be made on a low protein intake if ample carbohydrates are provided. However, if necessary, the liver will furnish the tissues with fuel made from protein. Likewise, fatty acids are broken down by the liver to acetoacetate which the extrahepatic tissues can rapidly metabolize to obtain energy. In the reaction, fatty acid→ketone body→CO_2 + H_2O, the major portion of heat formed is released at the second stage and excretion of ketone bodies carries out of the body considerable potential energy and may be a serious loss to the body. Contrary to popular medical opinion, ketones are normal intermediary products of metabolism and regularly furnish the body with appreciable amounts of energy. Indeed, the body does not derive energy economically from the diet unless a certain amount of fat is present.

The liver controls the proportions of each foodstuff converted into fuel for the tissues. This process, however, can get out of hand. When it does, ketosis results. The corrective is glucose, but it is no longer permissible to speak of "fat burning in the flame of carbohydrate." Ketosis is due to a relative or absolute lack of carbohydrate in the liver, which leads to excessive destruction of fat. Wastage of protein is closely related to ketosis—possibly the specific factor which controls it is the assumption by protein of the responsibilities of carbohydrate. During starvation, gross ketosis does not develop gradually as the glycogen is depleted but rapidly after metabolism is turned over to protein and fat. So long as a small amount of carbohydrate is furnished in the diet, calories can be derived chiefly from fat without increased expenditure of protein or development of ketosis, but carbohydrate yields to fat in liver oxidation when there is too much fat, too great release of NH_3 from amino acids, and too little sugar.

Protein, like carbohydrate, is not held in storage to any appreciable extent. Maintenance of body protein, then, is indispensable to life. Fat, on the other hand, can be stored lavishly and this fat can be drawn upon for energy to the point of depletion without neces-

sarily upsetting metabolism. It is more economical to set aside dietary fat as a reserve rather than to convert carbohydrate or protein derivatives into fat to conserve excess dietary calories since the process demands expenditure of energy for the transformation.

It is likely that many well-established "facts" regarding the behavior of carbohydrates, proteins and fats in the body will be set aside within the forseeable future. Interpretations of laboratory data are always based on one or more assumptions. When the latter are successfully challenged, the interpretations fall by the wayside. Only recently has the scientist devised chemical tools for evaluating biochemical theories. Use of radio-active tracers ("tagged" elements or isotopes) permits an insight into living processes never before possible. We must be prepared, therefore, for re-examination of everything we think we know.

There is a very considerable interconversion of foodstuffs within the body. Sugar is readily converted into glycerol and fatty acids for storage as fat. There is some conversion of sugar into certain amino acids through utilization of NH_3 released in deamination, but a more common reaction would appear to be exchange between amino and keto or hydroxy groups. Sugar is derived from protein, but to an unknown extent; the old value of 56 to 58 per cent is subject to serious question. Sugar is also obtainable from fatty acids as well as from glycerol. The liver normally releases sugar and ketones into the blood stream from fatty acids for the fuel needs of other tissues.

These multiple interconversions illustrate the futility of separate consideration of the foodstuffs. Furthermore, it has become evident that even the end-products of metabolism, as CO_2 and NH_3, cannot be regarded wholly as waste matter to be eliminated as quickly as possible. Both agents can be re-used, entering upon an anabolic pathway when presumably they have just completed catabolism.

Physiological chemistry was once visualized as ascent or descent of the metabolic ladder. A more suitable comparison for today's perspective would be a merry-go-round where untold numbers of chemical agents get on and off many times before they finish the ride. In the continuous interchange of constituent parts, original identity is lost in the metabolic pool.

According to the classical biochemical point of view, a person given enough carbohydrate, protein and fat to meet his demands would utilize this and not his own tissues. Experimentally, this theory has not been substantiated. He may burn more protein and carbohydrate than taken in and store the fat. It should be recognized that one cannot figure out dietary proportions and impose them willynilly upon a given subject, as many unknown and unpredictable factors are at work to alter the proportions used in metabolism.

Caloric Distribution. Numerous suitable combinations of carbohydrates, proteins and fats exist which are capable of supplying the body's needs. No standard can be set as ideal due to the wide

variability of circumstances. Climate, occupation, availability of supplies, traditional preferences, and the like determine choice. In temperate zones, a satisfactory distribution for a man requiring 3000 calories per day follows:

Carbohydrates	450 grams—1800 Calories,	60% of total
Fats	100 grams— 900 Calories,	30% of total
Proteins	75 grams— 300 Calories,	10% of total

Similarly, a woman with 2000-calorie need might take:

Carbohydrates	350 grams—1400 Calories,	70% of total
Fats	40 grams— 360 Calories,	18% of total
Proteins	60 grams— 240 Calories,	12% of total

Infants require a diet in which about 16 per cent of the total calories are furnished by protein, 35 to 40 per cent by fat and the remainder by carbohydrates. By the sixth year, the protein allowance usually furnishes about 13 per cent of the total calories.

Newburgh *et al* (1930) kept a normal man on the following diet for six months without ill-effect:

Carbohydrates	96 grams— 384 Calories,	10−% of total
Fats	271 grams—2439 Calories,	58+% of total
Proteins	338 grams—1352 Calories,	32+% of total

This is an extreme diet designed to test the effect of excessive protein intake upon the kidneys.

As the caloric demand becomes greater, as with heavy work in cold climates, an increasing proportion of fat is indicated with 45 per cent generally considered the desirable maximum. Under such circumstances, workers often choose an increase in the protein ration also, although theoretically it should not be required. Instinct, rather than theory, may be the better guide in this instance.

A high-fat intake can be harmful by interfering with digestion and absorption. Also, products of fat digestion hemolyze blood by rendering the serum injurious to red blood cells, increasing their fragility. Subsequent to a fat-rich meal, lipid particles in colloidal suspension circulate in the blood and can be deposited in certain arterial walls presumably leading to atherosclerosis. The implication is that fat is best eaten in a well-diluted form.

However, it has been reported by Stefansson that one can eat pemmican (made from buffalo or venison) in which 80 per cent of the calories come from fat, and do so 365 days a year, twice a day without tiring thereof or developing untoward symptoms. This is true only if pemmican alone constitutes the diet. Under such circumstances, bowel movements are normal at 5- to 7-day intervals.

Low fat intake is as undesirable as excessive ingestion. Skin ailments, perhaps, are most commonly complained of when the dietary fat supplies only about 5 per cent of the total calories. Fats are a

natural partner to carbohydrates: vegetables call for gravy or butter, salads for dressing, and so on. Fats add richness to biscuits and desserts, flavor to many foods. In reducing diets, it is customary to lower fat consumption drastically even to the point of attempted complete removal. On a 600-calorie diet, for example, the prescription may be for 75 grams each of protein and carbohydrate. For a 1000-calorie intake the distribution sometimes is:

Carbohydrates	150 grams— 600 Calories, 60% of total
Fats	11 grams— 100 Calories, 10% of total
Proteins	75 grams— 300 Calories, 30% of total

But for average diets it is generally held best to allow fat to provide at least 20 to 25 per cent of the calories.

The amount of carbohydrate shown in the preceding paragraph is probably more desirable that the 35-gram allowance on highly restricted reducing diets where the minimum has been placed at 0.6 gram per kilogram. The lowest intake consistent with continued health has not been experimentally determined, but even in diabetics it is not wise to reduce the carbohydrate intake to less than 100 grams per day for any length of time.

An average diet, then, might well contain:

Carbohydrates	450 grams—1800 Calories, 65% of total
Fats	75 grams— 675 Calories, 24% of total
Proteins	75 grams— 300 Calories, 11% of total

It should be apparent, however, that it is the function of the diet not so much to furnish particular quantities of carbohydrate, protein and fat, together with minerals and vitamins as it is to provide adequate amounts of specific chemical agents so that they will be available when wanted and where needed. There is not much sense in providing sugar for energy today and the vitamins necessary for release of the energy tomorrow. It is a common notion that dietary balance, however interpreted, can be achieved by spreading the desirable factors over a group of meals. Efficient provision of body requirements probably calls for "balance" at every meal, with the total intake distributed so as to meet, not climax, the day's activity.

CHAPTER 3.

NUTRITIVE AND CALORIC VALUES OF FOODS.

Arrangement of Tabulated Data.

Percentage values are not readily compared. A quick survey of portions will enable the clinician or nutritionist to assign to the patient a more logical diet. It is irrational to delete items from the diet merely because the percentage composition of fats, for instance, is high; the size of the portion served may be such as to make the fats negligible.

The household measure is necessarily a rough one. The metric equivalents have been brought to the nearest 5 grams, except where the total is less than 15 grams. The composition of this metric portion is calculated to the nearest first decimal, and the calories are estimated to the nearest 5 except where this value is exceedingly low.

In ascertaining average portions, the judgment of five or more persons has been considered and the accepted portion weighed. The greatest disagreement was encountered with the portions of meat. Finally, the allotment for raw meat (to be eaten cooked) was taken at ½ pound, and for cooked meat, at ¼ pound. For some persons these items should be halved.

Internationally distributed commercial brands of food are included in the tables to increase their value, since the use of these products has become so common. This innovation should facilitate the work of physicians, dietitians and nurses. With few exceptions the manufacturers are solely responsible for the analyses.

Wherever possible, carbohydrate data have been reported in the ensuing tables without fiber or other unassimilable matter. This is denoted by an asterisk on the percentage figure. Unfortunately this designation in most instances cannot be taken as representing true availability.

These tables have been arranged to show in plain numerals the percentage relationship of the various nutritive elements of specific foods. Simultaneously, the number of grams of each element in an average portion, together with the total caloric value of the same, is indicated in **boldface numerals.**

In handling such a mass of figures, many errors are liable to enter unnoticed. It is hoped with the care taken, that the mistakes in copying, calculating, checking and rechecking have been reduced to the vanishing point. If and when such errors are detected, the reader will report them, the author will consider it a great favor.

Bridges' Food Calorie Calculator.

The production of various editions of food tables necessarily required the authors to make a great number of calculations in

establishing gram quantities and Caloric values of the various foods.

It was found that, irrespective of the care observed in doing the mass of calculating necessary, apparently it was impossible to avoid arithmetical errors. The calculations were found to be more complicated when the Caloric values of 4.1, 4.1, 9.3 Calories per gram were utilized in place of 4.0, 4.0 and 9.0. To lessen the chance of error the appended key was devised to substitute the process of addition for multiplication.

Table 14 is herewith presented as a simple computing key for those called upon to calculate swiftly and accurately grams and Calories of any specific food.

By way of illustrating its application, the following example is submitted:

	Size of Portion.		Value of Portion.			
	Grams.		Carb.	Prot.	Fat.	Cal.
Lima beans, green, fresh . .	75	½ cup	**16.5**	**5.6**	**0.6**	**95**
			22.0	7.5	0.8	

The combined carbohydrate and protein gram content is 22.1.

The Caloric value of carbohydrates and proteins is 4.1 Calories per gram. The Caloric value of fat is 9.3 Calories per gram.

In order to determine the Caloric value of 22.1 grams of carbohydrates and of proteins and 0.6 of fat, additions are made as follows:

Grams from Key.			*Calories from Key.*
20.0 grams, carbohydrate and protein,	at 4.1 Calories per gram	=	82.0
2.0 grams, carbohydrate and protein,	at 4.1 Calories per gram	=	8.2
0.1 grams, carbohydrate and protein,	at 4.1 Calories per gram	=	0.4
22.1 grams			
0.6 gram, fat,	at 9.3 Calories per gram	=	5.6
		Total	96.2

It can readily be seen that this short cut reaches the result more rapidly and with far less likelihood of error than the orthodox methods. Needless to say the carrying of final Calorie values to decimal places is both needless and ridiculous. For practical purposes the nearest multiple of 5 is the accepted figure which in this instance is 95.

For the sake of completeness the Caloric Key also carries the alcoholic Caloric equation.

TABLE 14.—**Bridges' Caloric Key.**

Calories Alcohol (7.0)	**Gram Units.**	*Calories C. & P. (4.1)*	*Calories Fat (9.3)*
70	**10**	41	93
140	**20**	82	186
210	**30**	123	279
280	**40**	164	372
350	**50**	205	465
420	**60**	246	558
490	**70**	287	651
560	**80**	328	754
630	**90**	369	837
700	**100**	410	930
7	**1**	4.1	9.3
14	**2**	8.2	18.6
21	**3**	12.3	27.9
28	**4**	16.4	37.2
35	**5**	20.5	46.5
42	**6**	24.6	55.8
49	**7**	28.7	65.1
56	**8**	32.8	75.4
63	**9**	36.9	83.7
70	**10**	41.0	93.0
0.7	**0.1**	0.41	0.93
1.4	**0.2**	0.82	1.86
2.1	**0.3**	1.23	2.79
2.8	**0.4**	1.64	3.72
3.5	**0.5**	2.05	4.65
4.2	**0.6**	2.46	5.58
4.9	**0.7**	2.87	6.51
5.6	**0.8**	3.28	7.54
6.3	**0.9**	3.69	8.37
7.0	**1.0**	4.10	9.30
0.07	**0.01**	0.041	0.093
0.14	**0.02**	0.082	0.186
0.21	**0.03**	0.123	0.279
0.28	**0.04**	0.164	0.372
0.35	**0.05**	0.205	0.465
0.42	**0.06**	0.246	0.558
0.49	**0.07**	0.287	0.651
0.56	**0.08**	0.328	0.754
0.63	**0.09**	0.369	0.837
0.70	**0.10**	0.410	0.930

Throughout these tables, reference is constantly made to the term "Calorie." As taught in elementary physics, a calorie is that amount of heat necessary to raise the temperature of 1 cc. of water 1° C. In food chemistry a different type of heat unit is utilized, called the "large calorie" in contradistinction to the calorie just described, which is termed the "small calorie." The "large calorie" (food calorie) is the amount of heat necessary to raise 1 kg. (1000 cc.) of water 1° C. Based on this definition, the following heat values have been physiologically determined:

Table 15.—**Food Equivalents.**

1 gram carbohydrate	= 4.1 Cal.	1 gram fat	= 9.3 Cal.
1 gram protein	= 4.1 Cal.	1 gram alcohol	= 7.0 Cal.

Table 16.—**Abbreviations.**

Teaspoonful	= t.	Inch	= "
Tablespoonful	= T.	Slice	= sl.
Cup	= c.	Small	= sm.
Average	= av.	Large	= lg.
Diameter	= diam.	Strip	= str.
Square	= sq.	Medium	= med.
Pound	= lb.	Scant	= sc.
As purchased	= A.P.	Edible portion	= E.P.
Commercial	= com.	Concentrated	= Conc.

Table 17.—**Conversion Factors.**

1 Teaspoonful (fluid)	= 5 cc.	1 Teacup (fluid)	= 140 cc.
1 Dessertspoonful (fluid)	= 10 cc.	1 Cup (fluid)	= 236 cc.
1 Tablespoonful (fluid)	= 15 cc.	1 Tumbler (fluid)	= 236 cc.
1 Demi-tasse (fluid)	= 70 cc.	1 Glass (fluid)	= 236 cc.

3 Teaspoonfuls	= 1 Tablespoonful	30 Grams*	= 1 Ounce
4 Tablespoonfuls	= ¼ Cup	60 Grams†	= 2 Ounces
8 Tablespoonfuls	= ½ Cup	85 Grams‡	= 3 Ounces
16 Tablespoonfuls	= 1 Cup	115 Grams	= ¼ Pound
1 Cup	= 1 Glass	230 Grams	= ½ Pound
2 Cups	= 1 Pint	460 Grams	= 1 Pound
4 Cups	= 1 Quart	1 Kilogram	= 2.2 Pounds

All quantities are calculated as level and unpacked. For viscous substances the weight indicated is that held in the measuring instrument, not that delivered by rapid draining.

The cup referred to is the "Standard Measuring Cup."

* Actual value = 28.4 gm. † Actual value = 56.8 gm. ‡ Actual value = 85.2 gm.

EXPLANATION OF TABLE.

Due to the large volume of data collected subsequent to the first edition of this work, it has been necessary to delete a number of the commercial infiltrations. The remaining commercial items have been restricted to the more commonplace products.

Efforts have been made to present a table of international character inasmuch as foodstuffs of world-wide origin are available in most urban and many rural centers. It is essential that the composition of unusual foods be known so that they may be intelligently accorded a place in diet therapy.

The high incidence of blank spaces under the Carbohydrate content of meats and fish is due to the lack of available data. Carbohydrates are usually regarded as being absent in these groups. Glycogen, which is found in meats and fish, is a wholly assimilable carbohydrate and warrants determination and tabulation.

The establishment of the household measures was the result of investigation of the amounts of the various foods allotted per portion in the raw and cooked states in diet kitchens and hotels. Wherever portions could not be readily agreed upon or where it was impractical to obtain a sample of the food for examination and weight, the size of portion is presented as 100 grams.

Figures are given for the edible portion of foods in the **raw** or **fresh** state unless otherwise designated.

The several varieties of the same food are generally presented in the following order: *Raw, cooked (home), canned, commercial, dried, salted, spiced, etc.* "**Cooked**" implies boiling.

The grams in the household measures and the Calories, with few exceptions, are entered in multiples of 5 wherever the amounts are more than 15.

The **boldface** numerals indicate the number of grams and calories in an average portion. The plain numerals indicate the percentage composition thereof. *Italicized* letters indicate trade names.

Table 18.—Nutritive and Caloric Values of Foods.

A

A Food items.	Size of portion. Grams.	 Household measure.	Value of portion. Carb.	 Prot.	 Fat.	 Cal.
Abalone	230	½ lb.	**7.6**	**49.9**	**0.2**	**240**
			3.3	21.7	0.1	
Abalone, canned	100	⅔ c.	**3.7**	**21.7**	**0.1**	**105**
			3.7	21.7	0.1	
Acidophilus milk, com.	240	1 c.	**9.0**	**8.2**	**4.8**	**115**
			*3.8	3.4	2.0	
Agar-agar	10	1 T.	—	—	—	—
			*72.7	1.6	0.3	
Ale yeast, dried	10	2 t.	**4.8**	**3.9**	**0.1**	**35**
			48.4	38.9	1.2	
Alewives	230	½ lb.		**44.6**	**11.3**	**290**
				19.4	4.9	
Alfalfa bread	25	1 sl.	**16.0**	**2.6**	**0.3**	**80**
			64.0	10.6	1.3	
Algae, Hawaiian:						
Limu eleele	25	2 T.	—	**0.7**	—	**3**
			—	2.8	Trace	
Limu lipoa	25	2 T.	—	**0.4**	—	**2**
			—	1.6	Trace	
Alimentary pastes:						
Alphabets	25	¼ c.	**18.9**	**2.9**	**0.3**	**90**
			75.6	11.7	1.0	
Macaroni (average)	75	½ c.	**55.6**	**10.1**	**0.7**	**275**
			74.1	13.4	0.9	
Macaroni, boiled	240	1 c.	**37.9**	**7.2**	**3.6**	**220**
			15.8	3.0	1.5	
Noodles	60	½ c.	**45.4**	**7.0**	**0.6**	**220**
			75.2	11.7	1.0	
Spaghetti	100	¾ c.	**75.9**	**12.1**	**0.4**	**365**
			75.9	12.1	0.4	
Vermicelli	60	½ c.	**43.2**	**6.5**	**1.2**	**215**
			72.0	10.9	2.0	
All-Bran, Kellogg	3	1 T.	**1.7**	**0.4**	**0.1**	**9**
			*58.0	13.8	4.5	
Alligator pear, see Avocado.						
Almond butter	15	1 T.	**1.2**	**3.2**	**9.2**	**105**
			7.9	22.1	61.5	
Almond extract, Burnett, A.P.	5	1 t.	0	0	0	0
			0	0	0	
Almond meal	25	2 T.	**1.8**	**12.6**	**3.9**	**95**
			*7.2	50.6	15.6	
Almond paste (Marzipan)	10	1 t.	**1.1**	**1.3**	**3.5**	**50**
			10.9	13.2	34.5	
Almonds	30	20	**1.3**	**6.1**	**16.0**	**175**
			*4.3	20.5	53.5	
Alphabets	25	¼ c.	**18.9**	**2.9**	**0.3**	**90**
			75.6	11.7	1.0	
Amaranth, Chinese	100		**4.6**	**3.0**	**0.6**	**35**
			4.6	3.0	0.6	
American cheese, pale	15	2″ x 1½″ x ½″	Trace	**4.3**	**5.4**	**70**
			0.3	28.8	35.9	
American cheese, red	15	2″ x 1½″ x ½″	—	**4.4**	**5.7**	**70**
			—	29.6	38.3	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

A

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Anchovy	15	1	0.2	2.3	0.5	15
			*1.7	15.3	3.6	
Anchovy paste	6	1 t.	0.1	1.2	0.7	12
			*2.5	20.6	12.1	
Anserine, see Lambsquarters, Algerian.						
Apples:						
Summer	130	1, 2½″ diam.	12.2	0.4	0.5	55
			*9.4	0.3	0.4	
Fall	130	1, 2½″ diam.	13.5	0.4	0.4	60
			*10.4	0.3	0.3	
Winter	130	1, 2½″ diam.	14.6	0.4	0.4	65
			*11.2	0.3	0.3	
Baked without sugar	120	1	12.0	0.4	—	50
			*10.0	0.3	Trace	
Baked, canned	120	1	37.0	0.8	0.5	160
			*30.8	0.7	0.4	
Stewed without sugar	135	½ c.	5.9	0.1	—	25
			*4.4	0.1	Trace	
Dried	60	⅛ lb.	32.4	0.8	0.6	140
			*54.0	1.4	1.0	
Apple:						
Butter	40	1 heaping T.	19.6	0.2	0.4	85
			48.9	0.4	1.1	
Butter, com.	35	1 T.	14.7	0.3	—	60
			42.0	0.7	Trace	
Dumpling	100	1	28.1	2.4	9.3	210
			*28.1	2.4	9.3	
Flour (Italian)	100	⅔ c.	40.8	3.4	—	180
			*40.8	3.4	—	
Juice	120	½ c.	12.6	0.1	—	50
			*10.5	0.1	—	
Pie	100	1 sl	32.6	2.3	8.7	225
			*32.6	2.3	8.7	
Powder	10	1 T.	8.4	0.2	0.2	35
			84.1	1.5	2.5	
Pyequick, General Mills						
Apple slices	85	1 pkg.	76.8	1.3	0.3	315
			90.4	1.5	0.3	
Pie crust mix	255	1 pkg.	118.1	16.6	93.3	1380
			46.3	6.5	36.6	
Sauce, canned, unsweetened	135	½ c.	10.9	0.3	0.3	50
			*7.9	0.2	0.2	
Juice pack	135	½ c.	16.2	0.3	0.3	70
			*12.0	0.2	0.2	
Sweetened	135	½ c.	23.8	0.3	0.1	100
			*17.6	0.2	0.1	
Apricots	50	2, 1½″ diam.	3.3	0.3	—	15
			*6.7	0.6	—	
Canned, water pack	120	½ c.	7.7	0.6	0.1	35
			*6.4	0.5	0.1	
Canned, juice pack	120	½ c.	11.3	0.6	0.2	50
			*9.4	0.5	0.2	
Canned, in syrup	120	½ c.	25.7	0.7	0.1	110
			21.4	0.6	0.1	
Candied	10	1 half	8.7	—	—	35
			86.5	0.6	0.2	
Dried	50	10 halves	21.7	2.4	0.5	105
			*43.4	4.7	1.0	
Stewed without sugar	130	½ c. (10)	23.4	2.6	—	105
			*18.0	2.0	Trace	
Apricot jam	25	1 T.	13.7	0.2	—	55
			55.0	0.8	Trace	

A

	Size of portion.		Value of portion.			
Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Apricot sauce	130	½ c.	**63.4**	**2.5**	**1.7**	**285**
			48.8	1.9	1.3	
Arrowhead tubers (wappato) .	50	1 sm.	**11.1**	**4.2**	**0.6**	**70**
			*22.2	8.4	1.2	
Arrowroot starch	26	2 T.	**23.6**	**0.1**	—	**95**
			*90.6	0.4	0.1	
Artichokes:						
Globe or French	50	1, 3″ diam.	**6.0**	**1.5**	**0.2**	**30**
			11.9	2.9	0.4	
Globe, boiled	100	4 hearts	**2.7**	**1.1**	—	**15**
			*2.7	1.1	Trace	
French, canned	125	5 hearts, sm.	**5.5**	**1.0**	—	**25**
			*4.4	0.8	—	
Jerusalem	100	1 lg. tuber	**17.0**	**2.2**	**0.1**	**80**
			17.0	2.2	0.1	
Jerusalem, boiled . . .	100	1 lg.	**3.2**	**1.6**	—	**20**
			*3.2	1.6	Trace	
Asparagus, green	75	6, 6″ stalks	**1.9**	**1.7**	**0.2**	**15**
			*2.5	2.2	0.2	
Cooked	85	6, 3¼″ stalks	**1.2**	**1.8**	**0.3**	**15**
			*1.4	2.1	0.3	
Canned	85	6, 3¼″ long	**1.9**	**1.3**	**0.1**	**14**
			*2.3	1.5	0.1	
Canned, com.	100	5 stalks	**2.8**	**1.7**	**0.2**	**20**
			2.8	1.7	0.2	
Soup, canned, conc. . . .	140	½ c.	**9.8**	**1.8**	**1.7**	**65**
			7.0	1.3	1.2	
Soup, cream of, com. . .	240	1 c.	**9.1**	**1.9**	**7.9**	**120**
			3.8	0.8	3.3	
Asparagus-beans, pods . .	100	1 c.	**7.8**	**3.4**	**0.3**	**50**
			*7.8	3.4	0.3	
Asparagus-beans, sprouted seeds	100		**3.3**	**2.4**	**0.4**	**25**
			*3.3	2.4	0.4	
Aunt Jemima buckwheat, corn and wheat flour, Quaker .	100	¾ c.	**69.0**	**11.2**	**2.1**	**350**
			69.0	11.2	2.1	
Aunt Jemima pancake flour, Quaker	100	¾ c.	**71.6**	**10.4**	**1.5**	**350**
			71.6	10.4	1.5	
Avocados:						
Calavo strain, see Calavo .	.85	½ sm.	**5.1**	**1.8**	**17.0**	**185**
			6.0	2.1	20.0	
Florida	85	½, 3½″ long	**2.8**	**1.4**	**22.4**	**225**
			3.3	1.7	26.4	
Fuerte, hybrid race . . .	85	½, 3½″ long	**4.3**	**1.5**	**22.4**	**230**
			5.1	1.7	26.4	
Guatemalan race . . .	85	½, 3½″ long	**4.6**	**1.7**	**14.6**	**160**
			5.4	2.0	17.2	
Mexican race	50	½ med.	**3.4**	**1.0**	**11.6**	**125**
			6.7	2.0	23.2	
West Indian race (Alligator pear)	85	½, 3½″ long	**6.6**	**1.1**	**6.6**	**95**
			7.8	1.3	7.7	

B

Baby Ralston	15	1 T.	**10.7**	**2.2**	**0.3**	**55**
			71.6	14.8	2.0	
Bacillus acidophiius milk, com.	240	1 c.	**9.0**	**8.2**	**4.8**	**115**
			*3.8	3.4	2.0	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

B

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Bacon, smoked	80	4 str. 8½" long		8.4	51.8	515
				10.5	64.8	
Bacon, back, pea-mealed, Canadian, fried	60	⅛ lb.		16.2	2.8	90
				27.1	4.6	
Bacon, breakfast, broiled crisp	20	4 str. 7" long[1]		7.2	9.1	115
				35.8	45.6	
Baking Powders:						
Calumet			—	—	0	—
			34.3	—	0	
Davis			—	—	0	—
			41.2	—	0	
Loeb			0	0	0	0
			0	0	0	
Royal			—	—	0	—
			37.2	—	0	
Rumford			—	—	0	—
			44.0	0	0	
Bamboo shoots	100	¾ c.	5.1	2.5	0.3	35
			5.1	2.5	0.3	
Bananas, also see Plantain.						
Bananas	125	1, 7" x 1½"	26.2	1.6	0.8	120
			*21.0	1.3	0.6	
Bananas, Fla.	125	1 med.	28.0	1.5	0.3	125
			22.4	1.2	0.2	
Bananas, red	140	1	32.0	1.8	1.1	150
			22.7	1.3	0.8	
Banana or pisang flour	100	⅔ c.	72.5	3.5	0.8	320
			72.5	3.5	0.8	
Barley:						
Whole grain	30	¼ c.	23.2	3.7	0.5	115
			77.2	12.4	1.8	
Cream of	50	⅓ c.	38.0	5.6	0.8	185
			76.1	11.1	1.6	
Pearled	30	3 T.	23.2	2.6	0.3	110
			77.8	8.5	1.1	
Pearled, boiled	100	½ c.	27.6	2.9	0.6	130
			*27.6	2.9	0.6	
Robinson's patent	9	1 T.	7.0	0.6	0.1	35
			*78.3	6.3	1.0	
Scotch pearled, Quaker	30	3 T.	23.1	3.1	0.2	110
			77.1	10.5	0.8	
Meal and flour	130	1 c.	94.6	13.7	2.9	470
			72.8	10.5	2.2	
Basella, see Vinespinach.						
Bass, black	230	½ lb.		47.4	3.9	230
				20.6	1.7	
Bass, red	230	½ lb.		38.9	1.1	170
				16.9	0.5	
Bass, sea	230	½ lb.		46.0	2.3	210
				20.0	1.0	
Bass, striped	230	½ lb.		44.8	6.4	245
				18.6	2.8	
Bass, steamed	115	¼ lb.		22.4	5.9	145
				19.5	5.1	
Batavian endive	50	½ heart	0.5	0.6	Trace	5
			*0.9	1.1	0.1	

[1] One 7" strip raw bacon weighs 12–15 g.; cooked crisp, weight is reduced to 5–8 g. depending upon leanness of strip.

B

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Bean flour, lima	100	1¼ c. sc.	63.0	21.5	1.4	360
			63.0	21.5	1.4	
Bean soup, canned, conc.	140	½ c.	19.6	8.5	2.5	140
			14.0	6.1	1.8	
Soup, com.	250	1 c.	25.0	13.3	10.5	255
			10.0	5.3	4.2	
Beans:						
Baked, canned	250	1 c.	41.5	14.0	2.8	230
			16.6	5.6	1.1	
Baked, Boston style, com.	250	1 c.	45.0	15.0	20.0	430
			18.0	6.0	8.0	
Baked, pork and tomato sauce, com.	250	1 c.	50.0	18.8	5.0	330
			20.0	7.5	2.0	
Baked, vegetarian, com.	250	1 c.	50.0	17.5	—	275
			20.0	7.0	—	
Broad, green	75	½ c.	10.3	6.1	0.5	75
			*13.8	8.1	0.6	
Broad, green pods	100		11.9	3.0	0.3	65
			11.9	3.0	0.3	
Broad, cooked	125	½ c.	8.9	5.1	—	55
			*7.1	5.1	Trace	
Butter	75	¾ c.	21.8	7.1	0.5	125
			29.1	9.4	0.6	
Butter, cooked	100	½ c.	17.1	7.1	—	100
			*17.1	7.1	Trace	
Carob	10	4″ piece	6.7	0.6	0.1	30
			67.0	5.7	1.1	
Cranberry, young pods	100		0.6	0.4	0	4
			0.6	0.4	0	
Cranberry, medium pods	100		1.7	1.3	0.6	20
			1.7	1.3	0.6	
Fave	75	¾ c.	3.1	4.0	—	30
			4.2	5.4	—	
Fave, dried	75	½ c.	36.1	17.7	1.9	240
			48.2	23.6	2.5	
Frigoles, dried	75	⅓ c.	48.8	16.4	1.0	275
			65.1	21.9	1.3	
Green, canned	100	½ c.	3.4	1.2	0.1	20
			3.4	1.2	0.1	
Haricots, cooked	125	½ c.	20.7	8.2	—	120
			*16.6	6.6	Trace	
Haricots flageolets, canned	130	½ c.	14.9	5.9	0.1	85
			*11.5	4.6	0.1	
Haricots verts, canned	130	⅔ c.	2.6	1.4	0.1	15
			*2.0	1.1	0.1	
Kidney, baked, com.	250	1 c.	52.5	18.8	3.8	330
			21.0	7.5	1.5	
Kidney, canned	250	1 c.	43.3	17.5	0.5	255
			*17.3	7.0	0.2	
Lima, green	75	½ c.	16.5	5.6	0.6	95
			*22.0	7.5	0.8	
Lima, canned	130	½ c.	19.0	5.2	0.4	105
			14.6	4.0	0.3	
Lima, dried	75	½ c.	49.4	13.6	0.5	265
			65.9	18.1	1.5	
Lima, yellow, cooked	125	½ c.	27.5	11.2	1.0	170
			22.0	9.0	0.8	
Mesquite, dried	75	½ c.	57.8	9.2	1.9	290
			77.1	12.2	2.5	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

B

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Beans:						
Mung, solid, green seed	100		**59.9**	**23.3**	**1.0**	350
			59.9	23.3	1.0	
Mung, sprouts	125	1 c.	**4.1**	**3.6**	**0.4**	35
			*3.3	2.9	0.3	
Navy, dried	75	½ c.	**44.7**	**16.9**	**1.4**	270
			59.6	22.5	1.8	
Refugee, canned	130	⅔ c.	**6.5**	**1.0**	**0.1**	30
			5.0	0.8	0.1	
Scarlet runner, green pods	100		**4.7**	**1.4**	**0.1**	25
			*4.7	1.4	0.1	
Scarlet runner, cooked	130	⅔ c.	**1.2**	**1.0**	—	10
			*0.9	0.8	Trace	
Snap	75	¾ c.	**4.7**	**1.8**	**0.2**	30
			*6.3	2.4	0.2	
Soy, green	75	½ c.	**9.9**	**10.2**	**4.9**	130
			13.2	13.6	6.3	
Soy, green, cooked	125	½ c.	**17.2**	**18.0**	**4.4**	185
			13.8	14.4	3.5	
Soy, dried	100	½ c.	**33.1**	**30.2**	**15.3**	400
			33.1	30 2	15.3	
Soy, sprouts	65	½ c.	**4.1**	**5.5**	**1.2**	50
			6.3	8.5	1.8	
String	75	¾ c.	**5.8**	**1.8**	**0.2**	35
			7.7	2.4	0.2	
String, cooked	130	⅔ c.	**4.5**	**1.3**	**0.1**	25
			3.5	1.0	0.1	
String, cooked in much water	130	⅔ c.	**2.5**	**1.0**	**0.1**	15
			1.9	0.8	0.1	
String, canned	130	⅔ c.	**4.9**	**1.4**	**0.1**	25
			3.8	1.1	0.1	
Wax	75	½ c.	**11.0**	**3.5**	**0.2**	60
			14.6	4.7	0.3	
Wax, canned	130	⅔ c.	**3.2**	**1.3**	**0.1**	20
			*2.5	1.0	0.1	
Beech-Nut baby foods, see pages 141, 145.						
Beechnuts	20	⅓ c.	**2.6**	**4.4**	**11.5**	135
			13.2	21.9	57.4	
Beef, fresh:						
Brains	230	½ lb.	**2.5**	**22.1**	**21.4**	300
			1.1	9.6	9.3	
Brisket, medium fat	230	½ lb.		**36.3**	**65.6**	760
				15.8	28.5	
Chuck, average (f′, 9–32)	230	½ lb.		**43.3**	**35.4**	505
				19.2	15.4	
Cross ribs, average	230	½ lb.		**36.6**	**64.9**	755
				15.9	28.2	
Flank, average (f′, 30–62)	230	½ lb.		**33.6**	**92.0**	995
				14.6	40.0	
Fore-quarter, lean	230	½ lb.		**43.5**	**30.5**	460
				18.9	12.2	
Fore-shank, lean	230	½ lb.		**50.6**	**14.0**	340
				22.0	6.1	
Heart	115	¼ lb.	**1.2**	**18.4**	**23.5**	300
			1.0	16.0	20.4	
Hind-quarter, lean	230	½ lb.		**46.0**	**30.8**	475
				20.0	13.4	

f′, range of fat percentage.
* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

B

	Size of portion.		Value of portion.			
Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Beef, fresh:						
Hind-shank, lean	230	½ lb.		**50.4**	**12.4**	**320**
				21.9	5.4	
Hind-shank, fat	230	½ lb.		**46.9**	**43.2**	**595**
				20.4	18.8	
Kidney	155	½ c. diced	**0.6**	**25.7**	**7.4**	**175**
			0.4	16.6	4.8	
Liver	230	½ lb.	**5.8**	**46.9**	**12.4**	**310**
			2.5	20.4	5.4	
Loin, lean	230	½ lb.		**42.8**	**36.8**	**520**
				18.6	16.0	
Loin, average (*f′*, 16–43)	230	½ lb.		**38.9**	**57.5**	**695**
				16.9	25.0	
Lungs	115	¼ lb.		**17.8**	**3.5**	**105**
				15.5	3.0	
Marrow	20	1 T.		**0.4**	**18.6**	**175**
				2.2	92.8	
Muscle, not trimmed	230	½ lb.	**3.0**	**35.7**	**30.2**	**440**
			1.3	19.9	13.1	
Musclé, well trimmed	230	½ lb.	**3.1**	**46.4**	**12.9**	**325**
			1.4	20.2	5.6	
Neck, average (*f′*, 8–35)	230	½ lb.		**46.2**	**38.0**	**550**
				20.1	16.5	
Plate, lean	230	½ lb.		**35.9**	**43.2**	**550**
				15.6	18.8	
Plate and brisket, average (*f′*, 21–51)	230	½ lb.		**36.3**	**69.0**	**790**
				15.8	30.0	
Porterhouse steak	230	½ lb.		**50.4**	**46.9**	**645**
				21.9	20.4	
Ribs, average (*f′*, 12–44)	230	½ lb.		**40.0**	**52.9**	**655**
				17.4	23.0	
Rib rolls, lean	230	½ lb.		**46.5**	**24.2**	**415**
				20.2	10.5	
Round, average (*f′*, 8–24)	230	½ lb.		**44.4**	**29.9**	**460**
				19.3	13.0	
Rump, average (*f′*, 14–48)	230	½ lb.		**35.7**	**71.3**	**810**
				15.5	31.0	
Scraped	40	2 T.		**9.2**	**1.0**	**45**
				23.0	2.5	
Shank, fore, average (*f′*, 6–18)	230	½ lb		**46.9**	**20.7**	**385**
				20.4	9.0	
Shank, hind, average (*f′*, 7–23)	230	½ lb.		**46.2**	**23.0**	**405**
				20.1	10.0	
Shoulder and clod	230	½ lb.		**46.0**	**23.7**	**410**
				20.0	10.3	
Sides, average (*f′*, 13–39)	230	½ lb.		**40.3**	**50.6**	**635**
				17.5	22.0	
Sirloin steak	230	½ lb.		**43.5**	**42.5**	**575**
				18.9	18.5	
Suet	10	1 T.		**0.5**	**8.2**	**80**
				4.7	81.8	
Sweetbreads	115	¼ lb.		**19.3**	**13.9**	**210**
				16.8	12.1	
Tenderloin	230	½ lb.		**37.3**	**56.1**	**675**
				16.2	24.4	
Tongue	75	5 med. sl.	**0.8**	**14.6**	**17.7**	**230**
			1.1	19.4	29.6	

f′, range of fat percentage.
* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

B

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Beef, cooked:						
Boiled	115	¼ lb.	**0.5** 0.4	**39.2** 34.1	**8.6** 7.5	**245**
‡Broiled	115	¼ lb.	**0.8** 0.7	**39.3** 34.2	**9.4** 8.2	**250**
Chipped	60	⅛ lb.		**15.8** 26.4	**4.1** 6.9	**105**
Clod, braised	115	¼ lb.		**26.2** 22.8	**33.8** 29.4	**420**
Clod, roasted	115	¼ lb.		**29.1** 25.3	**25.3** 22.0	**355**
Corned, cooked	115	¼ lb.		**16.4** 14.3	**27.3** 23.8	**320**
‡Fillet, broiled	115	¼ lb.		**27.8** 24.2	**9.0** 7.9	**200**
‡Prime ribs, roasted	115	¼ lb.		**30.9** 26.9	**6.2** 5.4	**185**
Ribs, roasted, choice grade	115	¼ lb.		**24.7** 21.5	**42.7** 37.1	**500**
Ribs, roasted, good grade	115	¼ lb.		**29.1** 25.3	**25.3** 22.0	**315**
‡Roasted	115	¼ lb.		**31.6** 27.5	**5.6** 4.9	**185**
Roasted, cold	115	¼ lb.		**30.5** 26.5	**27.8** 24.2	**400**
‡Round of, boiled	115	¼ lb.		**32.2** 28.0	**3.6** 3.1	**165**
Round (bottom), braised	115	¼ lb.		**34.5** 30.0	**18.3** 15.9	**315**
Round (top), roasted, choice grade	115	¼ lb.		**32.5** 28.3	**19.1** 16.6	**310**
Round (top), roasted, good grade	115	¼ lb.		**35.2** 30.6	**10.3** 9.0	**240**
‡Sirloin, broiled	115	¼ lb.		**33.9** 29.5	**6.9** 5.1	**205**
Steak, fried, med. fat	115	¼ lb.		**23.5** 20.4	**23.5** 20.4	**315**
Steak, grilled	115	¼ lb.		**29.0** 25.2	**24.8** 21.6	**350**
‡Steak, round, broiled	115	¼ lb.		**34.3** 29.8	**3.6** 3.1	**175**
‡Steak, tenderloin, broiled, rare	115	¼ lb		**27.2** 23.9	**14.5** 12.6	**250**
‡Steak, tenderloin, broiled, well done	115	¼ lb.		**32.8** 28.5	**10.5** 9.1	**230**
‡Sweetbreads, boiled	80	2		**17.8** 22.2	**6.9** 8.6	**135**
Top clod, roasted	115	¼ lb.		**28.3** 24.6	**30.4** 26.4	**400**
Topside, boiled, lean	115	¼ lb.		**38.3** 33.3	**9.4** 8.2	**245**
Topside, roast, lean	115	¼ lb.		**30.7** 26.7	**17.3** 15.0	**285**
Topside, roast, med. fat	115	¼ lb.		**27.8** 24.2	**27.4** 23.8	**370**
Beef, canned:						
Collops, minced	115	¼ lb.	1.3 1.1	20.5 17.8	7.8 6.8	265

B

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Beef, canned:						
Corned	115	¼ lb.		**30.3**	**21.5**	**325**
				26.3	18.7	
Kidney, stewed	115	¼ lb.	**2.4**	**21.2**	**5.9**	**150**
			2.1	18.4	5.1	
Luncheon	115	¼ lb.		**31.7**	**18.3**	**300**
				27.6	15.9	
Roasted	115	¼ lb.		**30.0**	**17.0**	**280**
				25.9	14.8	
Sweetbreads	115	¼ lb.		**23.2**	**10.9**	**195**
				20.2	9.5	
Tongue, ground	115	¼ lb.		**24.6**	**28.9**	**370**
				21.4	25.1	
Tongue, whole	115	¼ lb.		**22.5**	**26.7**	**340**
				19.5	23.2	
Tripe	115	¼ lb.		**19.3**	**9.8**	**170**
				16.8	8.5	
Beef, miscellaneous:						
Dried, salted and smoked	60	⅛ lb.	**0.3**	**18.0**	**3.9**	**110**
			0.4	30.0	6.5	
Dripping	10	1 T.	**0**	**—**	**9.9**	**90**
			0	Trace	99.0	
Hash, corned, canned	230	½ lb.	**34.9**	**23.0**	**3.9**	**275**
			15.2	10.0	1.7	
Hash, roast, canned	230	½ lb.	**26.2**	**21.8**	**14.7**	**335**
			11.4	9.5	6.4	
Juice	120	½ c.		**5.9**	**0.7**	**30**
				4.9	0.6	
Sausage (beef and pork)	115	¼ lb.		**22.3**	**27.7**	**350**
				19.4	24.1	
Sausage, fried	60	2 oz.	**9.4**	**8.3**	**11.0**	**120**
			*15.7	13.8	18.4	
Soup, see Soups, canned.						
Spiced, corned and pickled	115	¼ lb.		**13.8**	**59.1**	**605**
				12.0	51.4	
Stew	115	¼ lb.	**2.9**	**12.8**	**6.7**	**125**
			*2.5	11.1	5.8	
Stew, canned	115	¼ lb.	**9.0**	**8.3**	**1.6**	**85**
			7.8	7.2	1.4	
Tongue, pickled	60	2 oz.		**7.7**	**12.3**	**145**
				12.8	20.5	
Tripe, corned and pickled	115	¼ lb.	**0.2**	**13.4**	**1.4**	**70**
			0.2	11.7	1.2	
Beefsteak sauce, com.	5	1 t., sc.	**0.8**	**0.1**	**Trace**	**4**
			16.0	2.3	1.2	
Beets, common red	100	⅔ c. diced	**8.8**	**1.6**	**0.1**	**45**
			*8.8	1.6	0.1	
Beets, cooked	100	½ c.	**6.5**	**2.3**	**0.1**	**35**
			*6.5	2.3	0.1	
Beets, canned	100	½ c.	**11.5**	**1.5**	**0.1**	**55**
			11.5	1.5	0.1	
Beet greens	100	1 c.	**4.2**	**2.0**	**0.3**	**30**
			*4.2	2.0	0.3	
Beet greens, cooked	135	½ c.	**4.3**	**3.0**	**—**	**30**
			3.2	2.2	—	
Bel Paese, Italian cheese	30	1 oz.		**6.4**	**7.0**	**90**
				21.3	23.5	
"Biotes" (acorns)	100		**48.0**	**8.1**	**37.4**	**580**
			48.0	8.1	37.4	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Biscuits, see Crackers						
Bisquick	130	1 c.	**85.8**	**10.4**	**16.2**	530
			66.0	8.0	12.5	
Black walnuts	35	6 (whole)	**4.1**	**9.7**	**19.7**	240
			11.7	27.6	56.3	
Black rice, see Rice, wild.						
Blackberries	60	½ c.	**5.0**	**0.8**	**0.6**	30
			*8.4	1.3	1.0	
Blackberries, stewed without sugar	120	⅔ c.	**4.6**	**0.8**	**—**	25
			*3.8	0.7	Trace	
Blackberries, canned, see Fruits, canned.						
Blackberry juice	120	½ c.	**8.4**	**0.4**	**—**	35
			7.0	0.3	—	
Blackfish	230	½ lb.		**43.0**	**3.0**	205
				18.7	1.3	
Black-salsify	100		**16.3**	**3.1**	**0.3**	80
			*16.3	3.1	0.3	
Blanc-mange	50		**9.1**	**1.6**	**1.8**	60
			*18.2	3.2	3.7	
Bloater	115	¼ lb.		**22.7**	**15.6**	240
				19.7	13.6	
Bloater, paste	6	1 t.	**0.2**	**1.2**	**0.7**	12
			*4.0	20.1	12.0	
Blood pudding or sausage	60	2 oz.		**8.9**	**20.7**	230
				14.8	34.6	
Blue pike	230	½ lb.		**43.0**	**1.2**	190
				18.7	0.5	
Blueberries	100	⅔ c.	**9.7**	**0.6**	**0.6**	50
			*9.7	0.6	0.6	
Blueberries, canned, water pack	120	½ c.	**10.8**	**0.5**	**0.5**	50
			9.0	0.4	0.4	
Blueberries, canned, juice pack	120	½ c.	**13.2**	**0.5**	**0.5**	60
			11.0	0.4	0.4	
Blueberries, canned, in syrup	120	½ c.	**31.2**	**0.5**	**0.5**	135
			26.0	0.4	0.4	
Blueberries, canned, see also Fruits, canned.						
Blueberry juice	120	½ c.	**14.9**	**0.1**	**—**	60
			*12.4	0.1	—	
Bluefish	230	½ lb.		**44.7**	**2.8**	210
				19.4	1.2	
Bockwurst	60	2 oz.		**7.0**	**13.1**	150
				11.7	21.8	
Bologna sausage	75	6 sl.	**0.2**	**14.0**	**13.2**	180
			0.3	18.7	17.6	
Bologna, all meat	75	6 sl.		**10.8**	**13.3**	170
				14.4	17.8	
Bologna, added cereal	75	6 sl.	**2.7**	**11.1**	**11.9**	165
			3.6	14.8	15.9	
Bondon cheese	30	2 T.		**2.8**	**7.3**	80
				9.4	24.4	
Bone-marrow	20	1 T.	**0**	**0.4**	**18.6**	175
			0	2.2	92.8	
Borage, leaves and stems	75	1½ c.	**0.2**	**2.1**	**0.3**	12
			*0.3	2.8	0.4	
Bouillon, beef, canned	240	1 c.	**0.7**	**6.2**	**0.2**	30
			0.3	2.6	0.1	

B

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Bouillon, beef, cube	3.6	1 cube	**0.2**	**0.4**	**0.1**	**3**
			5.8	11.4	1.8	
Bouillon, canned, conc.	120	½ c.	**0.1**	**4.7**	**—**	**20**
			0.1	3.9	—	
Bouillon, tomato, canned	240	1 c.	**1.0**	**2.6**	**0.7**	**20**
			0.4	1.1	0.3	
Bovril	7	1 t.	**0.2**	**2.7**	Trace	**11**
			3.4	38.8	0.2	
Brains, fresh:						
Beef	230	½ lb.	**2.5**	**22.1**	**21.4**	**300**
			1.1	9.6	9.3	
Horse	230	½ lb.		**28.1**	**29.2**	**385**
				12.2	12.6	
Lamb	230	½ lb.		**21.8**	**16.8**	**245**
				9.5	7.3	
Pork	230	½ lb.		**26.9**	**23.7**	**330**
				11.7	10.3	
Veal	230	½ lb.		**23.8**	**20.7**	**290**
				10.6	9.0	
Brains, cooked:						
Calf, boiled	115	¼ lb.		**13.8**	**6.7**	**120**
				12.0	5.8	
Sheep, boiled	115	¼ lb.		**13.5**	**7.7**	**125**
				11.7	6.7	
Bran Flakes, Kellogg	30	⅔ c.	**21.3**	**4.0**	**0.7**	**110**
			71.5	13.3	2.3	
Bran Flakes, Post	30	⅔ c.	**22.4**	**3.6**	**0.5**	**110**
			74.6	12.0	1.8	
Bran, wheat, Pillsbury	3	1 T.	**1.7**	**0.5**	**0.1**	**9**
			57.5	16.5	4.6	
Bran, whole, Post	3	1 T.	**2.0**	**0.4**	**0.1**	**11**
			66.6	13.9	3.0	
Braunschweiger sausage	60	2 oz.	**0**	**9.2**	**14.3**	**170**
			0	15.4	23.8	
Brazil nuts	30	4 av.	**1.2**	**4.1**	**18.4**	**195**
			*4.1	13.8	61.5	
Breads:						
Alfalfa	25	1 sl.	**16.0**	**4.9**	**0.3**	**90**
			64.0	19.6	1.3	
Boston brown	30	1 sm. sl.	**13.0**	**2.0**	**1.0**	**70**
			43.3	6.7	3.3	
Buns, cinnamon	50	1 med.	**28.0**	**3.9**	**2.7**	**155**
			56.0	7.8	5.4	
Corn	100	4½″ sq.	**43.6**	**6.6**	**7.3**	**275**
			43.6	6.6	7.3	
Cracked wheat, Ward	25	1 sl.	**11.9**	**2.1**	**0.7**	**65**
			47.9	8.6	2.9	
Crumbs, white, dried	55	½ c.	**41.8**	**7.2**	**1.1**	**210**
			76.0	13.0	2.0	
Flatbread	100		**73.6**	**14.9**	**0.5**	**365**
			73.6	14.9	0.5	
French	20	1 sl.	**10.8**	**1.6**	**0.2**	**55**
			53.8	8.1	1.0	
Ginger	60	1 sq.	**30.8**	**2.5**	**7.1**	**205**
			51.4	4.2	11.9	
Gluten wheat	25	1 sl.	**7.2**	**6.2**	**0.9**	**65**
			28.9	25.0	3.6	
Graham, made with milk	30	1 sl.	**14.1**	**3.0**	**1.2**	**85**
			47.0	10.0	4.0	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion.		Value of portion.			B
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal
Breads:						
Graham, made with water	30	1 sl.	14.7	2.7	0.9	80
			49.0	9.0	3.0	
Holland Rusk	15	1	10.5	1.8	0.7	55
			70.4	12.1	5.1	
Peanut	30	1 sl.	5.9	10.0	3.8	100
			19.7	33.6	12.8	
Pilot	25	1 cracker	18.6	2.8	1.3	100
			74.2	11.1	5.0	
Pumpernickel	25	1 sl.	12.4	1.7	0.3	50
			49.7	6.7	1.2	
Raisin	20	1 sl.	10.6	1.8	0.6	55
			53.0	9.0	3.0	
Rolls:						
French	40	1	22.3	3.4	1.0	115
			55.7	8.5	2.5	
Plain, enriched	50	1, 4½″ x 2½″	27.0	4.1	3.0	155
			54.1	8.2	6.1	
Sweet, unenriched	50	1	28.0	3.9	2.7	155
			56.0	7.8	5.4	
Vienna	50	1	28.3	4.3	1.1	145
			56.5	8.5	2.2	
Rye	25	1 sl.	13.3	2.3	0.2	65
			53.2	9.0	0.6	
Rye, black	30	1 sl.	14.7	2.9	0.2	75
			48.9	9.6	0.6	
Rye, Jewish	30	1 sl.	15.6	2.7	0.3	80
			52.0	9.1	1.1	
Rye, whole	30	1 sl.	11.4	3.6	0.2	65
			34.7	11.9	0.6	
Rye and wheat	25	1 sl.	12.9	3.0	0.1	65
			51.5	11.9	0.3	
Vienna	20	1 sl.	11.0	1.7	0.2	50
			55.2	8.4	1.0	
Wheat (average)	25	1 sl.	13.1	2.3	0.3	65
			52.6	9.2	1.3	
White, milk	25	1 sl.	12.4	2.2	0.9	65
			49.8	9.0	3.6	
White, enriched	25	1 sl.	13.1	2.1	0.5	65
			52.3	8.5	2.0	
Whole wheat	25	1 sl.	12.0	2.4	0.9	65
			48.0	9.5	3.5	
Yorkshire pudding	50	1 sq	13.4	3.6	4.7	115
			*26.8	7.2	9.4	
Zwieback	5	1, 3″ x 1¼″	3.7	0.5	0.5	20
			73.5	9.8	9.9	
Breadfruit, Hawaiian	100	½ c.	35.2	0.1	0.2	145
			35.2	0.1	0.2	
Breadstuffs, see Crackers, Toast, etc.						
Breakfast foods, see Cereals.						
Brick cheese	30	⅛″ sl. 5# loaf		6.6	9.0	110
				22.0	30.0	
Brick cheese, American	20	1⅓ cu. in.		4.0	5.5	70
				20.3	27.5	
Brie, fromage de, American	25	1½″ x 1″ x ¾″	0.4	4.0	5.3	65
			*1.4	15.9	21.0	
Brie, fromage de, European	25	1½″ x 1″ x ¾″		5.2	5.6	75
				20.9	22.4	
Br'er Rabbit molasses, Gold Label	190	½ c.	140.0	0.9	0	575
			*73.7	0.5	0	

B

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Br'er Rabbit molasses, Green Label	190	½ c.	133.2	1.7	0	555
			*70.1	0.9	0	
Brewer's yeast, com.	11	2 t.	4.3	4.2	0.2	35
			39.0	38.0	2.0	
Broad beans, green	75	½ c.	10.3	6.1	0.5	75
			*13.8	8.1	0.6	
Broad beans, green pods	100		11.9	3.0	0.3	65
			11.9	3.0	0.3	
Broad beans, cooked	125	½ c.	8.9	5.1	—	55
			*7.1	4.1	Trace	
Broccoli	120	1 c.	5.0	4.0	0.2	40
			*4.2	3.3	0.2	
Broccoli, cooked	100	½ c	0.4	3.0	0.1	15
			*0.4	3.0	0.1	
Broilers, see Chicken.						
Broth, see Soups.						
Brussels sprouts	100	1 c.	7.6	4.4	0.5	55
			7.6	4.4	0.5	
Brussels sprouts, cooked	100	½ c.	1.7	2.4	—	15
			*1.7	2.4	Trace	
Brussels sprouts, canned	125	⅔ c.	3.6	1.9	0.1	25
			*2.9	1.5	0.1	
Buckwheat, corn and wheat flour, Aunt Jemima, Quaker	100	¾ c.	69.8	11.2	1.9	350
			69.8	11.2	1.9	
Buckwheat flour (sifted)	115	1 c.	89.6	7.4	1.4	410
			77.9	6.4	1.2	
Buckwheat preparations, self-rising	115	1 c.	84.4	9.4	1.4	400
			73.4	8.2	1.2	
Buffalofish	230	½ lb.		41.5	5.4	220
				18.0	2.3	
Bullheads	230	½ lb.		33.1	47.2	575
				14.4	20.6	
Burdock leaves	100		7.4	4.5	0.1	50
			7.4	4.5	0.1	
Burdock root	100		21.1	3.0	0.1	100
			*21.1	3.0	0.1	
Burnett extracts, A.P.: †						
Almond (35%)	5	1 t.	0	0	0	0
			0	0	0	0
Celery (65%)	5	1 t.	0	0	0	0
			0	0	0	0
Cherry (18%)	5	1 t.	0	0	0	0
			0	0	0	0
Lemon (80%)	5	1 t.	0	0	0	0
			0	0	0	0
Maple, imitation (24%)	6	1 t.	1.8	0	0	7
			30.0	0	0	
Mint (85%)	5	1 t.	0	0	0	0
			0	0	0	
Onion, imitation (48%)	5	1 t.	0	0	0	0
			0	0	0	
Orange (82%)	5	1 t.	0	0	0	0
			0	0	0	

† Alcohol percentage by volume; calories not computed since there is a variable loss of alcohol through volatilization during cooking of foods.
* Largely assimilable.
‡ Gross fat removed.
Blank space indicates lack of data.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
B						
Burnett extracts, A.P.: †						
Pineapple (20%) . . .	6	1 t.	**2.8**	**0**	**0**	**12**
			47.0			
Pistachio, imitation (65%)	5	1 t.	**0**	**0**	**0**	**—**
			0	0	0	
Raspberry (20%) . . .	6	1 t.	**2.8**	**0**	**0**	**12**
			47.0	0	0	
Rose (94%)	5	1 t.	**0**	**0**	**0**	**0**
			0	0	0	
Strawberry (20%) . . .	6	1 t.	**2.8**	**0**	**0**	**12**
			47.0	0	0	
Vanilla (35%)	5	1 t.	**0.4**	**0**	**0**	**2**
			7.0	0	0	
Wintergreen (65%) . .	5	1 t.	**0**	**0**	**0**	**0**
			0	0	0	
Butter	10	1″ x 1″ x ½″	**—**	**0.1**	**8.5**	**80**
			—	1.0	85.0	
Butter, melted	10	1 T.	**—**	**0.1**	**8.5**	**80**
			—	1.0	85.0	
Butter beans	75	¾ c.	**21.8**	**7.1**	**0.5**	**125**
			29.1	9.4	0.6	
Butter beans, cooked . . .	100	½ c.	**17.1**	**7.1**	**—**	**100**
			*17.1	7.1	Trace	
Butterfish	230	½ lb.		**41.4**	**25.3**	**405**
				18.0	11.0	
Buttermilk, see Milks, cultured.						
Butternuts	20	12	**0.7**	**5.6**	**12.2**	**140**
			3.5	27.9	61.2	
Butterscotch	5	¾″ sq. x ⅜″	**4.1**	**0**	**0.6**	**20**
			*82.0	0	12.0	
C						
Cabbage:						
Raw	85	½ c.	**3.6**	**1.2**	**0.2**	**20**
			*4.4	1.4	0.2	
Spring, boiled	130	¾ c.	**1.0**	**1.4**	**—**	**10**
			*0.8	1.1	Trace	
Winter, boiled	130	¾ c.	**1.7**	**1.0**	**—**	**11**
			*1.3	0.8	Trace	
Chinese or celery . . .	110	1 c.	**2.6**	**1.5**	**0.1**	**20**
			2.4	1.4	0.1	
Chinese, cooked	100	⅔ c.	**2.0**	**1.0**	**0.1**	**13**
			2.0	1.0	0.1	
Palmetto	100	¾ c.	**6.1**	**3.3**	**0.6**	**45**
			6.1	3.3	0.6	
Palmetto, cooked . . .	100	⅓ c.	**5.6**	**2.9**	**0.5**	**40**
			5.6	2.9	0.5	
Red	60	½ c.	**1.8**	**1.1**	**0.1**	**15**
			*3.5	1.8	0.2	
Savoy.	120	1 c.	**7.2**	**3.9**	**0.8**	**55**
			6.0	3.3	0.7	
Savoy, boiled	100	½ c.	**1.1**	**1.3**	**—**	**10**
			*1.1	1.3	Trace	
Caciocavallo, Italian cheese .	5	1 t.		**1.7**	**1.1**	**15**
				34.3	22.0	
Cakes:						
Angel	50	1 sl.	**29.3**	**4.2**	**0.1**	**140**
			*58.7	8.4	0.3	
Foundation	50	1 sl.	**27.9**	**2.9**	**5.9**	**180**
			55.9	5.9	11.7	

† See footnote, page 620.

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Cakes:						
Foundation, frosted	60	1 sl.	**36.2**	**3.0**	**5.6**	**215**
			60.4	5.0	9.3	
Fruit, dark	60	1 sl.	**33.5**	**3.1**	**8.3**	**230**
			55.9	5.2	13.8	
Fruit, dark, com.	60	1 sl.	**37.8**	**2.9**	**8.3**	**245**
			63.0	4.8	13.8	
Fruit, light, com.	60	1 sl.	**39.0**	**2.6**	**7.5**	**240**
			65.0	4.4	12.5	
Jelly roll	50	1 sl.	**27.7**	**2.4**	**9.5**	**210**
			*55.4	4.8	19.0	
Plain	50	1 sl.	**28.5**	**3.2**	**4.1**	**170**
			57.0	6.4	8.2	
Plain, frosted	60	1 sl.	**37.3**	**3.1**	**3.7**	**200**
			62.1	5.2	6.2	
Pound	50	1 sl.	**24.7**	**3.6**	**11.7**	**225**
			49.3	7.1	23.5	
Rich	50	1 sl.	**27.1**	**2.5**	**8.9**	**205**
			54.2	5.0	17.7	
Rich, frosted	50	1 sl.	**29.1**	**2.2**	**7.3**	**195**
			58.2	4.4	14.7	
Scones (with egg)	100	1	**59.5**	**9.2**	**10.5**	**380**
			*59.5	9.2	10.5	
Scones (without egg)	100	1	**57.1**	**8.4**	**13.2**	**390**
			*57.1	8.4	13.2	
Shortbread	25	1 sq.	**16.4**	**1.4**	**5.7**	**125**
			65.6	5.8	23.0	
Sponge	50	1 sq.	**26.7**	**4.7**	**3.5**	**160**
			53.5	9.5	7.0	
Calavos (Avocado)	14	1 T.	**0.8**	**0.3**	**2.8**	**30**
			6.0	2.1	20.0	
Small	85	½	**5.1**	**1.8**	**17.0**	**185**
			6.0	2.1	20.0	
Diced	150	1 c.	**9.0**	**3.2**	**30.0**	**330**
			6.0	2.1	20.0	
Pulp	230	1 c.	**13.7**	**4.8**	**46.0**	**505**
			6.0	2.1	20.0	
Sieved pulp	230	1 c.	**10.1**	**4.8**	**46.0**	**490**
			4.4	2.1	20.0	
Calf's foot jelly	45	2 T.	**7.8**	**1.9**	**—**	**40**
			17.4	4.3	—	
Calves' liver, see Veal						
Camembert cheese, European	40	1 triangle		**9.0**	**10.5**	**135**
				22.2	26.3	
Campbell's strained baby soups, see page 141.						
Canada Dry ginger ale	225	1 c.	**20.3**			**85**
			9.0			
Candy:						
Butterscotch	5	¾″ sq. x ⅜″	**4.1**	**0**	**0.6**	**20**
			*82.0	0	12.0	
Caramels	10	⅞″ sq. x ½″	**7.8**	**0.2**	**1.2**	**45**
			*78.0	2.0	12.0	
Chocolate, bitter	6	¾″ x 1½″ x ¼″	**1.1**	**0.3**	**3.2**	**35**
			18.0	5.5	52.9	
Chocolate, sweetened, plain	6	¾″ x 1½″ x ¼″	**3.6**	**0.1**	**1.8**	**30**
			60.0	2.0	29.8	
Chocolate, sweetened, milk	6	¾″ x 1½″ x ¼″	**3.2**	**0.4**	**2.0**	**35**
			54.0	6.0	33.5	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat	Cal.
Candy:						
Chocolate, sweetened, milk, with almonds	6	¾″ x 1½″ x ¼″	3.1 51.0	0.5 8.0	2.3 38.6	35
Chocolate creams	14	1¼″ diam. x ¾″	10.1 72.0	0.6 4.0	2.0 14.0	60
Fondant	8	1″ sq. x ⅝″	7.3 *91.0	0 0	0 0	30
Fudge, plain	45	2″ sq. x ⅝″	39.6 88.0	0.9 2.0	1.8 4.0	185
Glacé fruits:						
Apricots	20	1 med.	17.3 86.5	— 0.6	— 0.2	70
Cherries	10	3	5.6 *55.8	— 0.6	0 0	25
Figs	15	1	11.0 73.7	0.5 3.5	— 0.2	45
Pears	30	1 oz.	22.8 75.9	0.4 1.3	0.2 0.6	95
Pineapple	50	1 sl.	40.0 80.0	0.4 0.8	0.2 0.4	165
Hard	8	3 balls, ¾″ diam.	7.9 *99.0	0 0	0 0	30
Marshmallows	30	5, 1¼″ diam.	24.0 *80.0	2.0 6.7	— —	105
Peanut brittle	15	1½″ x 3″	10.1 67.0	1.8 12.0	2.7 18.0	75
Toffee, home-made	10	1 sq.	8.8 *87.8	— 0.2	0.6 6.2	40
Cane, see sugars and syrups.						
Cantaloupe	100	¼, 5″ diam.	5.7 *5.7	0.6 0.6	0.2 0.2	25
Capers	5	1 t.	0.3 5.0	0.2 3.2	Trace 0.5	2
Capicollo, Italian sausage	60	2 oz.	0.8 1.4	12.5 20.8	24.1 40.2	245
Carambola juice	225	1 c.	23.2 10.3	0.2 0.1	0.2 0.1	100
Carnation milk, evaporated	15	1 T.	1.5 *9.9	1.0 6.8	1.2 7.9	20
Carob bean	10	4″ piece	6.7 67.0	0.6 5.7	0.1 1.1	30
Carp	230	½ lb.		43.7 19.0	2.3 1.0	200
Carrageen moss (Irish)	10	1 T.	— 0.4	0.7 6.8	— —	3
Carrot juice, Cellu	120	½ c.	7.2 *6.0	0.4 0.3	0.2 0.2	35
Carrot tops	100	1 c.	7.2 7.2	3.2 3.2		45
Carrots, old, raw	80	½ c. grated	4.3 *5.4	0.6 0.7	— Trace	20
Young, boiled	75	½ c.	3.4 *4.5	0.7 0.9	— Trace	15
Old, boiled	75	½ c.	3.2 *4.3	0.4 0.6	— Trace	15
Canned	100	⅔ c.	7.6 7.6	1.0 1.0	0.3 0.3	40
Desiccated	100		80.3 80.3	7.7 7.7	3.6 3.6	395
Cashew nut kernels, raw	100		29.4 29.4	21.6 21.6	39.0 39.0	570

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Cashew nut kernels, fried in cocoanut oil	15	8	2.0	4.3	7.9	100
			13.4	28.7	52.4	
Cassava:						
Bread	25	1 sl.	20.0	2.3	0.1	90
			79.0	9.1	0.3	
Root	100		27.1	1.6	0.2	120
			27.1	1.6	0.2	
Starch	60	½ c.	53.3	0.3	0.1	220
			88.8	0.5	0.1	
Sweet	100		28.4	1.1	0.2	125
			*28.4	1.1	0.2	
Wafers	25		20.9	0.3	Trace	85
			*83.6	1.1	0.2	
Catfish	230	½ lb.		33.1	47.2	575
				14.4	20.6	
Catfish, fried	115	¼ lb.	7.5	21.6	12.0	230
			*6.5	18.8	10.5	
Catfish, steamed	115	¼ lb.		23.5	4.3	135
				20.4	3.7	
Catjang-peas, green pods	100		6.6	3.3	0.4	45
			*6.6	3.3	0.4	
Catsup, tomato	20	1 T.	4.8	0.4	0.2	25
			24.0	2.0	1.0	
Cauliflower	125	1¼ c.	3.9	2.3	0.6	30
			*2.8	1.8	0.5	
Cauliflower, cooked	100	⅔ c.	1.4	1.6	0.4	15
			*1.4	1.6	0.4	
Cauliflower, canned	100	⅔ c.	3.0	1.0	0.2	18
			3.0	1.0	0.2	
Caviar, sturgeon, Russian	15	2 t.	1.1	4.5	3.0	50
			7.6	30.0	19.7	
Celeriac, cooked	100	1 med.	2.0	1.5	0.2	15
			*2.0	1.5	0.2	
Celeriac roots	90	1 med.	7.9	1.5	0.3	40
			8.8	1.7	0.3	
Celery:						
Raw	40	2, 7″ stalks	0.5	0.4	Trace	4
			*1.3	1.1	0.1	
Cooked	100	⅔ c.	0.8	0.3	—	5
			*0.8	0.3	Trace	
Cabbage	110	1 c.	2.6	1.5	0.1	20
			2.4	1.4	0.1	
Cabbage, cooked	100	⅔ c.	2.0	1.0	0.1	13
			2.0	1.0	0.1	
Extract, Burnett, A.P.	5	1 t.	0	0	0	0
			0	0	0	
Root (celeriac)	90	1 med.	7.9	1.5	0.3	40
			8.8	1.7	0.3	
Soup, canned	230	1 c.	11.5	4.8	6.4	125
			5.0	2.1	2.8	
Soup, canned, conc.	140	½ c.	9.5	2.0	2.2	70
			6.8	1.4	1.6	
Soup, cream of, canned, com.	230	1 c.	9.2	1.8	11.5	150
			4.0	0.8	5.0	
Cereal coffee infusion	240	1 c.	3.4	0.5	—	15
			1.4	0.2	—	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb	Prot.	Fat.	Cal.
Cereals:						
Ready to Eat:						
Bran:						
All-Bran, Kellogg	3	1 T.	**1.7**	0.4	0.1	9
			*58.0	13.8	4.5	
Flakes, Kellogg	30	⅔ c.	**21.3**	4.0	0.7	110
			71.5	13.3	2.3	
Flakes, Post	30	⅔ c.	**22.4**	3.6	0.5	110
			74.6	12.0	1.8	
Wheat, Pillsbury	3	1 T.	1.7	0.5	0.1	9
			57.5	16.5	4.6	
Whole, Post	3	1 T.	2.0	0.4	0.1	11
			66.6	13.9	3.0	
Corn:						
Flakes, Kellogg	30	1⅓ c.	**26.2**	2.2	0.1	115
			87.4	7.4	0.2	
Flakes, Quaker	30	1⅓ c.	**24.9**	2.6	0.1	115
			82.9	8.7	0.3	
Kix, General Mills	35	1½ c.	**26.4**	2.8	0.9	125
			81.0	8.0	2.5	
Post Toasties	30	1 c.	**25.6**	2.8	0.1	115
			85.5	7.1	0.2	
Oats:						
Cheerios, General Mills	30	1 heaping c.	**20.2**	4.6	2.1	120
			67.5	15.5	7.0	
Rice:						
Flakes, Heinz	30	1 c.	**25.0**	3.2	0.3	120
			83.2	10.5	0.9	
Flakes, White House	30	1 c.	**24.4**	2.7	0.6	115
			81.2	8.9	2.0	
Krispies, Kellogg	30	1 c.	**26.5**	1.8	0.1	115
			88.4	6.0	0.3	
Puffed, Quaker	15	1 c.	**13.3**	0.9	—	60
			88.8	6.2	0.2	
Rye:						
Flaked	30	1 c.	**22.7**	3.0	0.4	110
			*75.8	10.0	1.4	
Wheat:						
Crackels, Quaker	30	1 c.	**24.1**	3.3	0.1	115
			80.2	10.9	0.4	
Flakes, Quaker	30	1 c.	**22.7**	4.1	0.3	110
			75.6	13.7	1.1	
"*Force*" Whole wheat flakes, Hecker—H-O	30	1 c.	**23.8**	3.4	0.3	115
			*79.5	11.4	1.1	
Holland Rusk	15	1	**10.5**	1.8	0.7	55
			70.4	12.1	5.1	
Krispies, Kellogg	30	⅘ c.	**24.8**	2.7	0.2	115
			83.7	8.9	0.8	
Krumbles, Kellogg	30	½ c.	**24.6**	2.8	0.4	115
			82.0	9.2	1.2	
Muffets, Quaker	23	1	**17.5**	2.6	0.3	85
			75.6	11.1	1.4	
Puffed, Quaker	15	1 c.	**11.3**	2.3	0.2	55
			75.4	15.6	1.6	
Rippled, Loose-Wiles	10	1 biscuit	**7.9**	1.1	0.3	40
			*78.8	11.1	2.5	
Shredded, N. B. C.	30	1	**24.5**	3.3	0.5	120
			81.6	11.0	1.6	
Shredded Ralston	30	½ c.	**23.2**	2.6	0.3	110
			74.0	8.5	1.0	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Cereals:						
Ready to Eat:						
Toasted whole wheat with added wheat germ, Blue Cross .	30	1 c.	**21.3**	**4.4**	**0.6**	110
			70.9	14.7	2.1	
Wheaties	30	1 c.	**23.5**	**3.3**	**0.5**	110
			78.3	11.0	1.7	
Whole wheat biscuit, Kellogg	20	1, 2½" x 2¼"	**16.4**	**2.0**	**0.3**	80
			82.2	10.1	1.7	
Whole wheat flakes, Kellogg	30	¾ c.	**24.0**	**3.1**	**0.3**	115
			79.9	10.4	1.1	
Miscellaneous:						
Corn-Soya Shreds, Kellogg	30	⅔ c.	**22.2**	**5.4**	**0.1**	110
			74.0	18.0	0.3	
Grape-Nuts, Post . .	30	¼ c.	**24.9**	**3.2**	**0.2**	115
			83.2	10.6	0.6	
Grape-Nuts Flakes, Post	30	1 c.	**23.2**	**3.5**	**0.4**	115
			77.3	11.7	1.2	
Pep, Kellogg . . .	30	⅔ c.	**23.1**	**3.7**	**0.6**	115
			77.1	12.2	1.9	
Triscuit, N. B. C. . .	10	2	**8.2**	**1.1**	**0.2**	40
			81.7	10.5	1.6	
Cereals:						
Requiring Cooking:						
Barley:						
Cream of	50	⅓ c.	**38.0**	**5.6**	**0.8**	180
			76.1	11.1	1.6	
Corn:						
Hominy Grits, Quaker .	50	⅓ c.	**38.5**	**5.0**	**0.3**	180
			77.0	9.9	0.7	
Hominy Grits, Pillsbury	50	⅓ c.	**39.0**	**4.4**	**0.3**	180
			77.9	8.8	0.6	
Hominy (raw) . . .	50	¼ c.	**39.5**	**4.2**	**0.3**	180
			79.0	8.3	0.6	
Cooked	200	1 c., sc.	**28.0**	**4.0**	**—**	130
			14.0	2.0	—	
Hecker's cream . .	50	¼ c.	**38.6**	**4.9**	**0.2**	180
			77.3	9.8	0.4	
Parched	45	¼ c.	**32.5**	**5.2**	**3.8**	190
			72.3	11.5	8.4	
Samp, coarse hominy	50	¼ c.	**39.7**	**4.2**	**0.3**	185
			*79.4	8.3	0.5	
Cornmeal:						
White, Pillsbury . .	15	1 T.	**11.7**	**1.2**	**0.2**	55
			78.3	8.3	1.1	
White, Quaker . . .	15	1 T.	**11.6**	**1.3**	**0.2**	55
			77.3	8.9	1.5	
Yellow, Pillsbury . .	15	1 T.	**11.8**	**1.2**	**0.2**	55
			78.7	8.3	1.3	
Yellow, Quaker . .	15	1 T.	**11.7**	**1.3**	**0.1**	55
			77.8	8.5	1.0	
Cooked	100	½ c.	**11.9**	**1.4**	**0.8**	60
			11.9	1.4	0.8	
Oats:						
Crushed, Grandmother's	30	¼ c	**19.6**	**4.5**	**2.0**	120
			65.4	14.9	6.5	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —

Food items	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	C Cal.
Cereals:						
Requiring Cooking:						
Oats:						
H-O Oats (New style), Hecker, H-O . . .	30	¼ c.	**19.9**	**4.5**	**2.2**	**120**
			*66.2	15.2	7.3	
Mother's Quaker, Quick Mother's, or Quick Quaker	30	¼ c.	**19.2**	**5.3**	**1.8**	**120**
			64.0	17.8	6.1	
Rolled, raw	30	¼ c.	**19.9**	**5.0**	**2.2**	**120**
			66.3	16.7	7.3	
Rolled, cooked, calc. .	250	1 c.	**20.0**	**5.0**	**2.2**	**120**
			8.0	2.0	0.9	
Rolled, Purity . . .	30	¼ c.	**18.5**	**5.0**	**2.0**	**115**
			61.6	16.3	6.1	
Rice:						
Boiled	100	½ c.	**22.5**	**2.3**	**0.9**	**110**
			22.5	2.3	0.9	
Comet cereal . . .	20	1 heaping T.	**16.1**	**1.4**	Trace	**70**
			80.7	7.2	0.3	
Cream of	30	¼ c.	**23.9**	**2.2**	**0.1**	**110**
			79.6	7.4	0.4	
Natural brown, White House	20	1 heaping T.	**15.3**	**1.3**	**0.5**	**70**
			76.1	6.7	2.2	
White, White House .	20	1 heaping T.	**16.2**	**1.3**	**0.1**	**75**
			81.0	6.4	0.6	
Rye:						
Cream of	50	⅓ c.	**35.9**	**6.0**	**0.8**	**180**
			71.8	12.0	1.6	
Wheat:						
Breakfast wheat, Heinz .	20	2 T.	**15.5**	**2.1**	**0.2**	**75**
			77.7	10.5	0.9	
Cracked wheat . . .	30	¼ c.	**23.0**	**3.3**	**0.5**	**115**
			76.5	11.1	1.7	
Cream Farina, Hecker—H-O	30	¼ c.	**23.3**	**2.8**	**0.3**	**110**
			*77.7	9.5	1.1	
Cream of Wheat . .	30	¼ c.	**21.8**	**3.5**	**0.7**	**110**
			72.5	11.8	2.4	
Cream of Wheat, cooked	170	¾ c.	**24.7**	**3.4**	—	**115**
			14.5	2.0	—	
Cream of Wheat, "New 5-Minute" . . .	20	2 T.	**14.6**	**2.4**	**0.3**	**70**
			73.0	12.0	1.3	
Farina, Grandmother's, A. & P.	20	2 T.	**15.0**	**2.2**	**0.1**	**70**
			75.0	10.8	0.6	
Farina, Pillsbury . .	20	2 T.	**14.9**	**2.1**	**0.1**	**70**
			74.6	10.5	0.4	
Farina, Quaker . . .	20	2 T.	**15.1**	**2.4**	**0.1**	**70**
			75.4	11.8	0.6	
Flaked, cooked . . .	120	½ c.	**14.4**	**2.6**	**0.2**	**70**
			12.0	2.2	0.2	
Maltex Cereal . . .	30	¼ c.	**23.0**	**5.0**	**0.5**	**115**
			76.7	16.7	1.7	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Cereals:						
Requiring Cooking:						
Wheat:						
Pettijohn's, Quaker	20	2 T.	**14.7**	**2.0**	**0.4**	**70**
			73.3	10.1	1.9	
Ralston, wheat cereal	30	¼ c.	**21.0**	**4.5**	**0.5**	**110**
			70.0	15.0	1.7	
Rolled, steam-cooked	30	¼ c.	**21.7**	**3.1**	**0.5**	**105**
			72.3	10.2	1.8	
Rolled, with all the bran, Blue Cross	30	¼ c.	**22.0**	**3.1**	**0.5**	**110**
			73.2	10.5	1.6	
Wheathearts, Sperry	30	3 T.	**21.7**	**3.9**	**0.8**	**110**
			72.3	13.0	2.7	
Wheat Oata, Ralston	30	¼ c.	**20.8**	**4.2**	**1.7**	**120**
			69.3	14.0	6.0	
Wheatena	30	¼ c.	**21.7**	**3.2**	**0.8**	**110**
			72.7	10.8	2.5	
Wheatsworth cereal, N. B. C.	30	¼ c.	**21.2**	**4.2**	**0.6**	**110**
			70.8	14.0	2.0	
Cervellata fresca, Milan sausage	60	2 oz.	**0.3**	**6.0**	**20.6**	**215**
			0.5	10.1	34.4	
Chard, leaves only	100	1½ c.	**4.8**	**2.6**	**0.4**	**35**
			4.8	2.6	0.4	
Chard, leaves and stalks	100	1 c.	**4.4**	**1.4**	**0.2**	**25**
			4.4	1.4	0.2	
Chard, stalks only	125	1 c.	**3.6**	**1.3**	**0.1**	**20**
			2.9	1.0	0.1	
Chard, cooked	100	⅔ c.	**3.0**	**2.4**	**0.2**	**25**
			3.0	2.4	0.2	
Chayote, fruit (Chiote)	100		**6.8**	**1.0**	**0.1**	**30**
			6.8	1.0	0.1	
Chayote, leaves (Chiote)	100		**3.9**	**3.1**	**0.7**	**35**
			3.9	3.2	0.7	
Chayote, roots (Chiote)	100		**19.6**	**1.8**	**0.1**	**90**
			19.6	1.8	0.1	
Cheese:						
American, Kraft	30	⅛″ sl. 5# loaf		**6.8**	**9.3**	**115**
				22.5	31.0	
American, pale	15	2″ x 1½″ x ½″	Trace	**4.3**	**5.4**	**70**
			*0.3	28.8	35.9	
American, red	15	2″ x 1½″ x ½″		**4.4**	**5.7**	**70**
				29.6	38.3	
Bel Paese	30	1 oz.		**6.3**	**7.0**	**90**
				21.3	23.5	
Bondon	30	2 T.		**2.8**	**7.3**	**80**
				9.4	24.4	
Brick, American	20	1½ cu. in.		**4.0**	**5.5**	**70**
				20.3	27.5	
Brick, Kraft	30	⅛″ sl. 5# loaf		**6.6**	**9.0**	**110**
				22.0	30.0	
Brie, European	25	1½″ x 1″ x ¾″		**5.2**	**8.1**	**100**
				20.9	32.4	
Caciocavallo, Italian	5	1 t.		**1.7**	**1.1**	**15**
				34.3	22.0	
Camembert, European	40	1 triangle		**9.0**	**10.5**	**135**
				22.2	26.3	
Chateau, Borden	30	3, $\frac{3}{16}$″ sl. ½#	1.8	**5.6**	**7.7**	**100**
			[illegible]	18.8	25.5	

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C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Cal.
Cheese:						
Cheddar	25	1½″ x 1½″ x 1¼″	1.0	6.9	9.2	120
			*4.1	27.7	36.8	
American (store)	25	1½″ x 1½″ x 1¼″	0.3	7.8	9.2	120
			*1.4	21.2	37.0	
Argentinian	25	1½″ x 1½″ x 1¼″	0.2	7.8	7.6	95
			*0.7	31.2	26.0	
Canadian	25	1½″ x 1½″ x 1¼″		6.0	8.4	105
				24.0	33.8	
English	25	1½″ x 1½″ x 1¼″	0.8	6.9	7.6	100
			*3.2	27.8	30.5	
Skim, American	25	1½″ x 1½″ x 1¼″		8.3	1.2	45
				33.1	4.9	
Cheshire	20	1 cu. in.	1.0	5.0	6.2	80
			*5.2	25.0	30.9	
Cottage	55	¼ c.	2.4	11.5	0.6	65
			*4.3	20.9	1.0	
Cottage, Jewish	50	¼ c.		14.0	4.5	100
				28.0	9.0	
Cottage, potted	50	¼ c.		10.5	17.0	200
				21.1	34.0	
Cottage, skim milk	50	¼ c.		11.6	0.5	50
				23.3	1.0	
Coulommieres	25	1½″ x 1″ x ¾″	1.2	4.3	5.1	70
			*4.8	17.4	20.5	
Cream, American	30	⅓ pkg.	Trace	3.0	11.4	120
			*0.2	10.0	38.0	
Cream, English	30	2″ x 1″ x ½″	0.4	1.6	16.8	165
			*1.3	5.3	56.1	
Cream, demi-sel, French	30	2″ x 1″ x ½″		4.3	11.9	125
				14.5	39.9	
Creamed Old English, Kraft	30	3, $\frac{3}{16}$″ sl. ½# loaf		6.0	10.1	120
				20.0	33.5	
Derbyshire	20	1 cu. in.	0.9	4.9	7.0	90
			*4.4	24.5	35.2	
Dutch	30	1 oz.		11.1	5.3	95
				37.1	17.7	
Edam	30	1⅛″ cube	1.9	7.1	10.2	130
			*6.3	23.5	34.0	
Edam, American	30	1⅛″ cube		9.3	6.8	100
				30.9	22.7	
Emmenthaler	30	2 cu. in.	0.4	8.5	8.5	115
			*1.4	28.4	28.5	
Fromage de Brie	25	1½″ x 1″ x ¾″	0.3	4.0	5.3	65
			*1.4	15.9	21.0	
Full cream	30	2″ x 1″ x ½″	0.7	7.8	10.1	130
			*2.4	25.9	33.7	
Gammelost, Norwegian	30	1 oz.	2.9	12.9	1.0	75
			*9.8	42.1	3.4	
Gloucester	20	1 cu. in.	0.9	5.6	5.6	80
			*4.4	28.0	28.0	
Goat's milk, French	30	1 oz.	4.6	10.0	8.7	140
			*15.3	33.6	25.9	
Goat's milk, Norwegian	30	1 oz.	14.0	2.2	5.9	120
			*46.8	7.6	19.9	
Gorgonzola	15	1″ x ½″ x 2½″	0.2	3.8	5.2	65
			*1.6	25.2	34.7	
Gouda, American	30	1 oz.		8.8	7.3	105
				29.6	24.5	
Gouda, Hollander	30	1 oz.		8.1	8.8	115
				27.0	29.4	
Goya	30	1 oz.	0.4	10.3	9.1	130
			*1.4	34.2	30.4	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal
Cheese:						
Gruyère	30	2" x 1" x 1"	**1.4**	**9.9**	**8.4**	**125**
			*4.8	33.0	28.2	
Leyden	20	1 cu. in.	**0.2**	**7.2**	**2.2**	**50**
			*1.0	35.9	11.0	
Liederkranz	30	1 oz.		**5.0**	**7.3**	**90**
				16.8	24.5	
Limburg, American	40	1 triangle		**11.4**	**12.0**	**160**
				28.5	29.8	
Limburg, European	40	1 triangle		**8.5**	**7.8**	**105**
				21.3	19.6	
Limburger, Kraft	30	3, 3/16" sl. 1/2#		**4.8**	**7.5**	**90**
				16.0	25.0	
Livarot	25	1 1/2" x 1" x 3/4"	**2.0**	**7.9**	**5.5**	**90**
			*8.0	31.8	22.0	
Mainz, hand	30	2 cu. in.		**11.1**	**1.7**	**60**
				37.3	5.6	
Mozzarella	30	1 oz.	**0.5**	**8.4**	**7.3**	**105**
			*1.8	28.1	24.3	
Münster	30	1 1/8" cube	**2.0**	**5.0**	**7.8**	**100**
			*6.9	16.9	25.9	
Münster, American	30	1 1/8" cube		**6.7**	**9.3**	**115**
				22.2	31.0	
Mysost, American	30	1 oz.		**2.9**	**0.8**	**20**
				9.9	2.8	
Mysost (Scandinavian Primost)	30	1 oz.		**4.2**	**10.3**	**115**
				14.0	34.5	
Neufchâtel	30	2 T.	**0.5**	**5.6**	**8.2**	**100**
			*1.5	18.7	27.4	
Neufchâtel, American	30	2 T.	**0.8**	**6.4**	**5.4**	**80**
			*2.9	21.3	18.2	
Noekkelost	30	1 oz.	**2.1**	**9.2**	**4.9**	**90**
			*7.0	30.6	16.3	
Oka, see Port du Salut.						
Pabst-ett	15	1 T.	**1.0**	**3.0**	**3.6**	**50**
			6.6	19.9	24.3	
Pabst-ett compounded Swiss cheese	30	1 oz.	**1.4**	**7.1**	**6.5**	**95**
			4.6	23.6	21.8	
Parmesan	5	2 t.		**2.2**	**1.0**	**15**
				43.5	19.1	
Parmesan (Formaggio)	5	2 t.		**2.5**	**1.1**	**20**
				49.4	22.7	
Parmesan (Reggian), grated	5	2 t.		**1.7**	**1.4**	**20**
				34.8	27.3	
Philadelphia cream, Kraft	30	1/3 pkg.	Trace	**3.0**	**11.4**	**120**
			*0.2	10.0	38.0	
Pimento (Cheddar)	20	1 cu. in.		**3.2**	**6.4**	**75**
				16.0	32.2	
Pimento, Kraft	30	1/8" sl. 5# loaf		**6.6**	**9.1**	**110**
				22.0	30.5	
Pineapple	25	1 1/2" x 1 1/2" x 1 1/4"	**0.7**	**7.5**	**9.7**	**125**
			2.6	29.9	38.9	
Pont l'Evêque	20	1 1/2" x 1" x 1/2"	**1.3**	**4.1**	**5.0**	**70**
			*6.7	20.3	25.0	
Pont l'Evêque, American	20	1 1/2" x 1" x 1/2"		**5.0**	**5.9**	**75**
				25.2	29.3	

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C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Cal
Cheese:						
Port du Salut (Oka, Trappist)	25	1½" x 1" x ¼"		5.5	6.3	80
				21.2	25.2	
Pot	50	¼ c.		14.0	4.5	100
				28.0	9.0	
Potted cottage cheese	50	¼ c.		10.5	17.0	200
				21.1	34.0	
Provolone	30	1 oz.		10.3	7.5	110
				34.1	25.1	
Reindeer milk	30	1 oz.	0.9	7.1	12.9	155
			*3.0	23.8	43.1	
Ricotta romana	50	¼ c.		3.4	19.7	195
				6.9	39.5	
Ricotta salata	30	1 oz.	0.6	4.1	15.4	160
			*2.0	13.8	51.3	
Romano (Pecorino)	30	1 oz.		9.3	8.3	115
				31.2	27.7	
Roquefort	15	1" x ½" x 2½"	0.3	3.4	4.4	55
			*1.8	22.6	29.5	
Sap Sago	5	1 t. grated		2.1	0.1	10
				41.7	2.0	
Sbrinz	30	1 oz.	0.4	10.2	8.6	125
			*1.3	34.0	28.6	
Scamorzza	30	1 oz.	0.5	8.0	7.7	105
			*1.8	26.6	25.8	
Smearcase (Schmierkäse)	50	¼ c.		14.0	4.5	100
				28.0	9.0	
Smoked	10	2 t.		1.8	1.9	25
				18.6	19.0	
Stilton	25	1½" x 1½" x 1¼"		7.3	7.8	105
				29.0	31.2	
Store, see Cheddar, American.						
Swiss	30	1 sl.	0.4	8.3	10.4	130
			*1.3	27.6	34.9	
Swiss, European	30	1 sl.		8.7	9.2	120
				29.2	30.6	
Swiss, Kraft	30	⅛" sl. 5# loaf		7.9	7.8	105
				26.5	26.0	
Swiss, Russian	30	2" x 1" x 1"	1.3	7.4	9.7	125
			*4.4	24.9	32.3	
Swiss, Swedish	30	2" x 1" x 1"	1.8	6.9	10.9	135
			*6.1	23.2	36.4	
Trappist, see Port du Salut.						
Velveeta, Kraft	30	3, 3/16" sl. ½#	1.8	5.4	7.5	100
			*6.0	18.0	25.0	
Vendôme	30	2 T.		8.4	6.3	105
				28.0	20.9	
Wiltshire	20	1 cu. in.	0.5	6.8	3.9	65
			*2.3	34.2	19.3	
Yoghurt, American	30	2 T.		5.2	9.0	105
				17.5	30.2	
York cream	25	2" x 1½" x 1"		4.5	1.6	30
				17.9	6.5	
Chenopodium, see Lambsquarters.						
Cherries	75	½ c.	12.5	0.8	0.6	60
			16.7	1.0	0.8	
Cherries, eating	75	½ c.	8.9	0.4		40
			*11.9	0.6		
Cherries, canned, see Fruits, canned.						

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Cherries, candied	10	3	**5.6**	**—**	**0**	**25**
			*55.8	0.6	0	
Cherries, Maraschino, bottled	10	2	**2.8**	**—**	**—**	**10**
			*28.4	0.2	0.2	
Cherry extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**	**0**
			0	0	0	
Cherry jam	25	1 T.	**22.5**	**0.4**	**—**	**95**
			55.0	0.9	Trace	
Cherry jelly	45	2 T.	**34.7**	**0.5**	**—**	**145**
			77.2	1.1	—	
Chervil, leaves	20	⅓ c.	**2.3**	**0.7**	**0.2**	**14**
			11.5	3.4	0.9	
Cheshire cheese	20	1 cu. in.	**1.0**	**5.0**	**6.2**	**80**
			*5.2	25.0	30.9	
Chestnuts, fresh	50	8	**18.3**	**1.2**	**1.3**	**90**
			*36.6	2.3	2.7	
Chestnuts, dried	35	8	**26.0**	**3.7**	**2.5**	**185**
			74.2	10.7	7.0	
Chestnuts, roasted	50	20	**17.7**	**2.6**	**2.3**	**105**
			35.4	5.2	4.5	
Chicken, fresh:						
Broiler	230	½ lb.		**49.6**	**5.8**	**255**
				21.5	2.5	
Gizzard	75	1 med.	**0.5**	**17.3**	**2.8**	**100**
			0.6	23.1	3.8	
Heart	30	1 med.		**6.2**	**1.7**	**40**
				20.7	5.5	
Liver	75	2 med.	**1.8**	**16.8**	**3.2**	**105**
			2.4	22.4	4.2	
Young, dark meat	230	½ lb.		**47.8**	**18.9**	**375**
				20.8	8.2	
Young, light meat	230	½ lb.		**50.2**	**17.0**	**365**
				21.9	7.4	
Chicken, cooked:						
Boiled	115	¼ lb.		**30.1**	**11.8**	**235**
				26.2	10.3	
Breast, roasted	115	¼ lb.		**35.2**	**2.3**	**160**
				30.6	2.0	
‡Broiler, broiled	115	¼ lb.		**27.4**	**4.2**	**150**
				23.8	3.7	
Canned, boned	115	¼ lb.		**30.1**	**13.9**	**255**
				26.2	12.1	
‡Light meat, broiled	115	¼ lb.		**36.6**	**1.3**	**160**
				31.8	1.1	
Roasted	60	2 oz.	**1.3**	**19.3**	**2.6**	**120**
			2.1	32.1	4.4	
Roasted, cold	115	¼ lb.		**27.9**	**7.7**	**190**
				24.3	6.7	
‡Thigh and leg, boiled	115	¼ lb.		**31.7**	**8.5**	**210**
				27.6	7.4	
‡Thigh and leg, roasted	115	¼ lb.		**31.8**	**9.7**	**220**
				27.7	8.4	
Chicken soups, see Soups.						
Chickpeas	100	½ c.	**49.9**	**21.8**	**5.0**	**340**
			49.9	21.8	5.0	
Chicory, also see Endive.						
Chicory leaves, green	15	¼ sm. head	**0.6**	**0.2**	**Trace**	**3**
			4.0	1.6	0.2	
Chicory leaves, Italian	20	½ c.	**0.2**	**0.4**	**0.1**	**3**
			0.8	1.9	0.4	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Chicory root	100		**15.0**			**60**
			15.0			
Chili con carne, canned	100	½ c.	**4.0**	**13.3**	**4.6**	**115**
			4.0	13.3	4.6	
Chili con carne, Heinz	100	½ c.	**9.2**	**7.4**	**6.6**	**130**
			9.2	7.4	6.6	
Chili pepper, dried	100		**8.6**	**18.0**	**2.7**	**135**
			*8.6	18.0	2.7	
Chili sauce, com.	20	1 T.	**5.2**	**0.5**	**0.2**	**25**
			26.0	2.5	0.8	
Chinese or celery cabbage	110	1 c.	**2.6**	**1.5**	**0.1**	**20**
			2.4	1.4	0.1	
Chinese cabbage, cooked	100	⅔ c.	**2.0**	**1.0**	**0.1**	**13**
			2.0	1.0	0.1	
Chinese jujube	100		**24.1**	**1.2**	**0.3**	**110**
			24.1	1.2	0.3	
Chinese jujube, dried	100		**59.9**	**4.0**		**260**
			59.9	4.0		
Chiote, see Chayote.						
Chipped beef	60	⅛ lb		**15.8**	**4.1**	**105**
				26.4	6.9	
Chives, fresh	7	1 T.	**0.4**	**0.3**	**—**	**3**
			*5.8	3.8	0.6	
Choc-Lade, chocolate-flavored milk	250	1 c.	**29.8**	**9.0**	**5.0**	**205**
			11.9	3.6	2.0	
Chocolate:						
Beverage, see Cocoa, p. 149.						
Baker's unsweetened	14	½ oz.	**3.5**	**1.7**	**7.4**	**90**
			25.0	12.0	53.0	
Bitter	6	¾″ x 1½″ x ¼″	**1.1**	**0.3**	**3.2**	**35**
			18.0	5.5	52.9	
Sweet, plain	6	¾″ x 1½″ x ¼″.	**3.6**	**0.1**	**1.8**	**30**
			60.0	2.0	29.8	
Sweet, milk	6	¾″ x 1½″ x ¼″	**3.2**	**0.4**	**2.0**	**35**
			54.0	6.0	33.5	
Sweet, milk, with almonds	6	¾″ x 1½″ x ¼″	**3.1**	**0.5**	**2.3**	**35**
			51.0	8.0	38.6	
Chocolate creams	14	1¼″ diam. x ¾″	**10.1**	**0.6**	**2.0**	**60**
			72.0	4.0	14.0	
Chow-chow, com.	25	1 T.	**0.5**	**—**	**0.8**	**10**
			2.0	Trace	3.0	
Chow-chow, Heinz	25	1 T.	**0.6**	**0.4**	**0.3**	**6**
			2.5	1.6	1.4	
Chutney, apple	20	1 T.	**10.1**	**0.2**	**—**	**40**
			*50.3	0.8	0.1	
Chutney, tomato	20	1 T.	**7.4**	**0.2**	**—**	**30**
			*37.2	1.1	0.1	
Cider, sweet apple	230	1 c.	**32.7**	**0.2**	**0**	**135**
			*14.2	0.1	0	
Cinnamon buns	50	1 med.	**28.0**	**3.9**	**2.7**	**155**
			56.0	7.8	5.4	
Citrang juice	120	½ c.	**8.3**	**1.5**	**—**	**40**
			6.9	1.3	—	
Citron, fresh, unripe	100		**9.4**	**0.2**	**0.3**	**40**
			*9.4	0.2	0.3	
Citron, candied	75	½	**58.6**	**0.4**	**1.1**	**250**
			78.1	0.5	1.5	
Citron, preserved	10	1 sm. piece	**4.5**	**—**	**—**	**20**
			*45.0	0.2	0.4	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Clams:						
Long (soft-shell), sm.	40	6	**1.1**	**5.4**	**0.7**	**35**
			2.8	13.6	1.7	
Long (soft-shell), med.	60	6	**1.7**	**8.1**	**1.0**	**50**
			2.8	13.6	1.7	
Long (soft-shell), lg.	120	6 (½ c.)	**3.4**	**16.3**	**2.0**	**100**
			2.8	13.6	1.7	
Long, canned	75	⅓ c.	**2.2**	**6.8**	**1.0**	**45**
			2.9	9.0	1.3	
Round (hard-shell), sm., "Little Neck"	70	6 (¼ c.)	**3.6**	**7.4**	**0.8**	**55**
			5.2	10.6	1.1	
Round (hard-shell), med. "Cherrystone"	90	6 (⅓ c.)	**4.7**	**9.5**	**0.9**	**65**
			5.2	10.6	1.1	
Round (hard-shell), lg.	180	6 (¾ c.)	**9.4**	**19.0**	**1.9**	**135**
			5.2	10.6	1.1	
Round, canned	80	⅓ c.	**2.4**	**8.5**	**0.6**	**50**
			3.0	10.5	0.8	
Clam bouillon, canned	120	½ c.	**1.8**	**1.7**	**0**	**14**
			1.5	1.4	0	
Clam chowder, canned, con.	140	½ c.	**13.6**	**4.2**	**5.7**	**125**
			9.7	3.0	4.1	
Clam chowder, canned	250	1 c.	**10.0**	**4.5**	**2.5**	**85**
			4.0	1.8	1.0	
Clapp's Baby Foods, see pages 142, 145, 147.						
Coca-Cola	180	1 bottle	**14.4**	**—**	**—**	**60**
			8.0	—	—	
Cocoa beverage, see page 149.						
Cocoa, breakfast, W. Baker	5	2 t.	**1.9**	**0.9**	**1.3**	**25**
			38.0	19.0	27.0	
Cocoa, powder	5	2 t.	**1.9**	**1.1**	**1.4**	**25**
			37.7	21.6	28.9	
Cocoa shells	100		**—**	**—**	**—**	**0**
			Trace	Trace	Trace	
Cocoanut:						
Fresh	10	1″ sq.	**2.8**	**0.6**	**5.1**	**60**
			27.9	5.7	50.6	
Desiccated	100	1½ c.	**38.1**	**4.3**	**41.0**	**545**
			*38.1	4.3	41.0	
Milk pack, F. Baker	100	½ c.	**8.4**	**1.8**	**17.4**	**205**
			8.4	1.8	17.4	
Moist, canned	100	1¼ c.	**30.0**	**4.4**	**41.4**	**515**
			*30.0	4.4	41.4	
Premium package, F. Baker	100	1⅓ c.	**43.0**	**4.3**	**43.0**	**595**
			43.0	4.3	43.0	
Southern style, F. Baker	100	1¼ c.	**42.0**	**3.9**	**39.5**	**555**
			42.0	3.9	39.5	
Milk	120	½ c.	**5.5**	**0.5**	**1.8**	**40**
			*4.6	0.4	1.5	
Milk, prepared	100		**31.5**	**6.3**	**57.4**	**670**
			31.5	6.3	57.4	
Cocomalt	9	1 T.	**7.0**	**1.2**	**0.3**	**35**
			78.3	13.1	3.7	
Cod:						
Boneless, salt	60	⅛ lb.		**15.8**	**0.2**	**65**
				26.3	0.3	

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Blank space indicates lack of data.

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C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Cod:						
Cooked	100	1 sm. piece	1.6	21.7	0.3	100
			1.6	21.7	0.3	
Fried	115	¼ lb.	3.3	23.8	5.4	160
			*2.9	20.7	4.7	
Grilled	115	¼ lb.		31.0	6.0	185
				27.0	5.3	
Steamed	115	¼ lb		20.7	1.0	95
				18.0	0.9	
Desiccated	60	⅛ lb.		43.2	2.9	205
				72.0	4.9	
Dressed	230	½ lb.		25.5	0.5	110
				11.1	0.2	
Salt, cooked	50	½ c.		21.1	0.3	90
				42.3	0.5	
Steaks	230	½ lb.		43.0	1.2	190
				18.7	0.5	
Codfish cakes, fried	50	1 med.	4.9	6.0	6.9	110
			*9.8	12.1	13.9	
Cod-liver oil	14	1 T.	0	0	14.0	130
			0	0	100.0	
Cod roe, fried	60	2 oz.	1.8	12.4	7.1	125
			*3.0	29.6	11.9	
Cod roe, baked in vinegar	60	2 oz.		14.4	1.9	75
				24.0	3.2	
Coffee, beverage	240	1 c.	1.7	0.5	—	9
			0.7	0.2	—	
Coffee, beverage	70	1 demi-tasse	0.5	0.1	—	3
			0.7	0.2	—	
Coffee, cereal, beverage	240	1 c.	3.4	0.5	—	15
			1.4	0.2	—	
Coffee, pulverized	12	1 heaping T	0.2	1.5	1.8	25
			1.8	12.3	15.7	
Coffee, roasted, ground	10	1 heaping T.	0.2	1.2	1.6	20
			1.8	12.3	15.7	
"Coffee" cream, see 20% cream, p. 102.						
Collards (Colewort)	100	1 c.	7.3	4.0	0.6	50
			7.3	4.0	0.6	
Collards, cooked	100	½ c.	5.0	3.5	0.5	40
			5.0	3.5	0.5	
Comet cereal, rice	20	1 heaping T.	16.1	1.4	Trace	70
			80.7	7.2	0.3	
Conch meat	115	¼ lb		21.4	0.7	95
				18.6	0.3	
Condiments, Relishes, etc.:						
Beefsteak sauce, com.	5	1 t., sc.	0.8	0.1	Trace	4
			16.0	2.3	1.2	
Capers	5	1 t.	0.3	0.2	Trace	2
			5.0	3.2	0.5	
Catsup, tomato	20	1 T.	4.8	0.4	0.2	25
			24.0	2.0	1.0	
Chili sauce, com.	20	1 T.	5.2	0.5	0.2	25
			26.0	2.5	0.8	
Chow-chow, com.	25	1 T.	0.5	—	0.8	10
			2.0	Trace	3.0	
Chutney, apple	20	1 T.	10.1	0.2	—	40
			*50.3	0.8	0.1	
Chutney, tomato	20	1 T.	7.4	0.2	—	30
			*37.2	1.1	0.1	
Garlic	—	1 clove	—	—	—	—
			20.0	4.4	0.2	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Condiments, Relishes, etc.:						
Horseradish	10	2 t.	**1.9**	**0.3**	Trace	**9**
			*19.0	3.2	0.2	
India relish, Heinz	25	1 T.	**7.0**	**0.1**	**0.1**	**30**
			28.0	0.5	0.3	
Ketchup, tomato	20	1 T.	**5.0**	**0.5**	**0.2**	**25**
			25.0	2.5	0.8	
Mustard, dry	5	1 t.	**—**	**0.1**	**—**	**—**
			0.3	2.4	0.3	
Mustard, prepared	5	1 t.	**0.2**	**0.2**	**0.2**	**5**
			5.0	4.7	4.1	
Olives, green	25	5	**2.9**	**0.3**	**6.9**	**75**
			11.6	1.1	27.6	
Olives, ripe	20	5, 1″ long	**0.8**	**0.3**	**5.0**	**50**
			4.3	1.7	25.0	
Pepper sauce (green), Heinz	5	1 t.	**0.1**	**—**	**—**	**0**
			2.9	0.7	0.5	
Pepper sauce (red), Heinz	5	1 t.	**0.1**	**—**	**0.1**	**0**
			2.4	1.3	2.7	
Peppers, red	25	3″ piece	**2.0**	**0.3**	**0.2**	**11**
			8.1	1.3	0.7	
Pickles:						
Cucumber, fresh, com.	20	3 sl.	**3.2**	**0.2**	**—**	**14**
			15.9	1.2	0.2	
Dill	50	1 med.	**1.4**	**0.2**	**0.1**	**5**
			2.7	0.5	0.3	
Mixed, chopped	10	1 T.	**0.4**	**0.1**	**—**	**5**
			4.0	1.1	0.4	
Onions, sour, com.	10	2	**0.1**	**—**	**—**	**0**
			1.0	0.2	Trace	
Onions, sweet, com.	10	2	**3.7**	**—**	**—**	**15**
			3.70	0.1	Trace	
Sour, chopped, com.	20	1 T.	**—**	**0.1**	**0.1**	**1**
			Trace	0.5	0.3	
Sweet, chopped, com.	20	1 T.	**7.2**	**0.1**	**0.1**	**30**
			36.0	0.5	0.3	
Sweet must'd, chopped, com.	25	1 T.	**6.3**	**—**	**0.2**	**25**
			25.0	Trace	0.8	
Pimentos, canned	11	1 t.	**0.8**	**0.1**	Trace	**4**
			6.8	0.9	0.3	
Salad dressings, see p. 123.						
Soy bean sauce (Hawaiian)	10	2 t.	**0.5**	**0.8**		**5**
			5.0	7.8	—	
Soy sauce (Toyo)	10	2 t.	**1.2**	**0.5**	**0.2**	**9**
			*12.0	4.5	1.5	
Tabasco Sauce			**0**	**0**	**0**	**0**
			0	0	0	
Vinegars:						
Cider	5	1 t.	Trace	**0**	**0**	**—**
			0.8	0	0	
Malt	5	1 t.	Trace	**0**	**0**	**—**
			0.5	0	0	
Spiced, salad	5	1 t.	**0.5**	**0**	**0**	**2**
			10.0	0	0	
Tarragon	5	1 t.	Trace	**0**	**0**	**—**
			0.2	0	0	
Wine	5	1 t.	Trace	**0**	**0**	**—**
			0.4	0	0	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion.		Value of portion.			
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Condiments, Relishes, etc.:						
Worcestershire sauce	5	1 t.	**1.0**	Trace	**—**	4
			19.0	1.1	Trace	
Consommé, canned	240	1 c.	**—**	**7.9**	**—**	30
			Trace	3.3	Trace	
Consommé, canned, con.	120	½ c.	**0.1**	**4.7**	**—**	20
			0.1	3.9	—	
Consommé, Madriléne, Heinz	240	1 c.	**1.4**	**6.7**	**—**	35
			0.6	2.8	Trace	
Cookies, see Crackers and Biscuits.						
Corn:						
Crosby, canned	115	½ c.	**18.6**	**3.0**	**1.3**	100
			16.2	2.6	1.1	
Golden bantam, canned	115	½ c.	**19.0**	**3.0**	**1.0**	100
			16.6	2.6	0.9	
Green, very young	100	½ c.	**15.0**	**3.0**	**0.8**	80
			15.0	3.0	0.8	
Green, canned	115	½ c.	**20.9**	**3.2**	**1.4**	115
			*18.2	2.8	1.2	
Sweet, med.	100	1 ear, 8″	**21.0**	**3.5**	**1.1**	110
			21.0	3.5	1.1	
Sweet, med., cooked	100	1 ear, 8″ (½ c.)	**19.2**	**3.1**	**1.0**	100
			*19.2	3.1	1.0	
Sweet, old	100	½ c.	**26.0**	**4.5**	**1.8**	140
			26.0	4.5	1.8	
Popped	15	1 c.	**11.8**	**1.6**	**0.8**	60
			78.7	10.7	5.0	
Corn bread	100	1, 4½″ sq.	**43.6**	**6.6**	**7.3**	275
			43.6	6.6	7.3	
Corn chowder, Heinz	250	1 c.	**20.5**	**3.7**	**6.0**	155
			8.2	1.5	2.4	
Corn Flakes, Kellogg	30	1⅓ c.	**26.2**	**2.2**	**0.1**	115
			87.4	7.4	0.2	
Corn Flakes, Quaker	30	1⅓ c.	**24.9**	**2.6**	**0.1**	115
			82.9	8.7	0.3	
Corned beef, average	230	½ lb.		**35.9**	**59.7**	735
				15.6	26.2	
Corned beef, cooked	115	¼ lb.		**16.4**	**27.3**	320
				14.3	23.8	
Corned beef, canned	115	¼ lb.		**30.3**	**21.5**	325
				26.3	18.7	
Corned beef hash, canned	230	½ lb.	**26.0**	**18.4**	**6.2**	240
			11.3	8.0	2.7	
Corned mutton, canned	115	¼ lb.		**33.1**	**26.2**	380
				28.8	22.8	
Cornmeal:						
White, Pillsbury	15	1 T.	**11.7**	**1.2**	**0.2**	55
			78.3	8.3	1.1	
White, Quaker	15	1 T.	**11.6**	**1.3**	**0.2**	55
			77.3	8.9	1.5	
Yellow, Pillsbury	15	1 T.	**11.8**	**1.2**	**0.2**	55
			78.7	8.3	1.3	
Yellow, Quaker	15	1 T.	**11.7**	**1.3**	**0.1**	55
			77.8	8.5	1.0	
Cooked	100	½ c.	**11.9**	**1.4**	**0.8**	60
			11.9	1.4	0.8	
Corn-oil	115	½ c.	0	0	**115.0**	1070
			0	0	100.0	
Corn-oil	14	1 T.	0	0	**14.0**	130
			0	0	100.0	
Cornsalad (fetticus)	25	½ c.	**0.9**	**0.5**	**0.1**	7
			3.6	2.0	0.4	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal
Cornstarch	60	⅓ c.	**54.0**	—	—	220
			90.0	—	—	
Cornstarch	8	1 T.	**7.2**	—	—	30
			90.0	—	—	
Cottage cheese	55	¼ c.	**2.4**	**11.5**	**0.6**	65
			*4.3	20.9	1.0	
Cottage cheese, Jewish	50	¼ c.		**14.0**	**4.5**	100
				28.0	9.0	
Cottage cheese, potted	50	¼ c.		**10.5**	**17.0**	200
				21.1	34.0	
Cottage cheese, skim milk	50	¼ c.		**11.6**	**0.5**	55
				23.3	1.0	
Cottolene	11	1 T.	**0**	**0**	**11.0**	100
			0	0	100.0	
Cotton-seed oil	11	1 T.	**0**	**0**	**11.0**	100
			0	0	100.0	
Coulommieres, French cheese	25	1½″ x 1″ x ¾″	**1.2**	**4.3**	**5.1**	70
			4.8	17.4	20.5	
Cowpeas, green	100	⅔ c.	**22.7**	**9.4**	**0.6**	135
			22.7	9.4	0.6	
Cowpeas, dried	100	½ c.	**60.8**	**21.4**	**1.4**	350
			60.8	21.4	1.4	
Crab apples	90	6, 1½″ diam.	**16.0**	**0.4**	**0.3**	70
			17.8	0.4	0.3	
Crab apple juice	120	½ c.	**13.4**	—	—	55
			*11.2	—	—	
Crabmeat, blue (Atlantic), canned	60	2 oz.		**10.8**	**0.2**	75
				18.0	0.4	
Crabmeat paste	6	1 t.	**0.4**	**1.1**	**0.3**	9
			*6.8	18.8	5.2	
Crabs, Japanese	85	½ c.		**16.9**	**0.7**	75
				19.9	0.8	
Crabs, Norwegian	85	½ c.		**16.9**	**2.9**	95
				19.8	3.4	
Crabs, boiled	60	2 oz.		**11.5**	**3.1**	75
				19.2	5.2	
Crabs (Eastern, hard), canned	85	½ c.	**0.6**	**13.4**	**1.3**	70
			0.7	15.8	1.5	
Cracker meal	100	¾ c.	**72.9**	**10.9**	**6.0**	400
			72.9	10.9	6.0	
Cracked wheat	115	1 c.	**88.0**	**12.8**	**2.0**	430
			76.5	11.1	1.7	
Crackers and Biscuits:						
Afternoon tea	3	1	**2.6**	**0.2**	**0.5**	15
			77.7	6.3	14.9	
Animal	2	1	**1.9**	**0.1**	**0.3**	11
			81.0	5.9	12.6	
Arrowroot	4	1	**3.6**	**0.2**	**0.6**	20
			82.0	4.7	12.9	
Boston	25	4	**17.8**	**2.8**	**2.1**	105
			71.1	11.0	8.5	
Butter	12	3, 2″ diam.	**8.6**	**1.2**	**1.2**	50
			71.6	9.6	10.0	
Cocoanut bars	10	2	**7.2**	**0.6**	**1.7**	50
			71.6	6.2	16.7	
Cookies, crisp, thin, rich	10	1	**7.0**	**0.8**	**1.8**	50
			69.8	7.8	18.0	
Cookies, soft, thick	20	1	**14.6**	**1.4**	**2.1**	85
			73.0	6.8	10.5	

* Largely assimilable.
Blank space indicates lack of data

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Negligible quantity is designated by —

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat	Value of portion. Cal.
Crackers and Biscuits:						
Cookies, iced thinly	10	1	6.3	0.6	2.5	50
			63.4	5.7	24.9	
Frosted thickly	20	1	15.0	0.8	2.0	85
			75.0	4.0	10.0	
Cream	25	2, 3″ diam.	17.4	2.4	3.3	110
			69.7	9.7	12.1	
Egg	35	4	23.3	4.4	4.9	160
			66.6	12.6	14.0	
Fig bars	30	2	22.7	1.3	1.4	110
			75.8	4.2	4.8	
Fig Newtons	30	2	23.0	1.3	0.6	105
			76.8	4.4	2.0	
Five o'clock tea	12	3	9.1	1.0	1.4	55
			75.6	7.9	11.5	
Ginger snaps	30	8, 1½″ diam.	22.8	2.0	2.6	155
			76.0	6.5	8.6	
Graham	25	3, 3″ sq.	18.5	2.5	2.4	110
			73.8	10.0	9.4	
Large, N. B. C.	25	3	19.2	1.9	2.5	110
			76.6	7.6	9.8	
Old fashioned, Sunshine	7	1	5.4	0.5	0.8	30
			77.2	7.3	11.6	
Small, N. B. C.	20	6	15.5	1.5	1.9	85
			77.7	7.7	9.4	
Sunshine	7	1	5.6	0.5	0.8	35
			80.8	7.2	12.3	
Krispy crackers, Sunshine	3	1	2.5	0.3	0.4	15
			73.4	9.9	12.2	
Lady-fingers	0	5, 2½″ long	21.2	2.6	1.5	110
			70.6	8.8	5.0	
Lorna Doone	25	3	16.4	1.7	5.5	125
			65.7	6.9	22.1	
Macaroons	25	2, 1⅝″ diam.	16.3	1.6	3.8	110
			65.2	6.5	15.2	
Matzoth	20	1, 6″ diam.	14.0	3.0	—	70
			70.0	15.0	—	
Matzoth, N. B. C.	25	4	21.8	2.6	0.2	100
			86.7	10.5	0.9	
Molasses cookies	10	1	7.7	0.6	0.9	40
			76.7	6.4	8.9	
Nabisco, vanilla	20	6	14.3	1.1	4.2	100
			71.7	5.4	21.2	
Oatmeal	35	3	24.0	4.1	3.9	150
			69.0	11.8	11.1	
Oyster	25	⅔ c.	17.6	2.8	2.6	110
			70.5	11.3	10.5	
Oyster, Sunshine	18	½ c.	14.2	1.7	2.0	85
			78.7	9.6	10.9	
Oysterettes, N. B. C.	13	12	9.2	1.3	1.4	55
			70.7	9.9	10.6	
Peanut cookies	10	1	5.4	1.4	2.8	55
			53.5	14.0	27.5	
Pilot bread	25	1 cracker	18.6	2.8	1.3	100
			74.2	11.1	5.0	
Ry-Krisp, Ralston	6	1	3.7	0.8	0.1	20
			*61.9	13.1	2.0	
Saltina Biscuit, N. B. C.	11	3	7.7	1.0	1.4	50
			70.1	9.3	12.9	
Saltines	20	3 double	13.7	2.1	2.5	90
			68.5	10.6	12.7	
Saltines, Sunshine	3	1	2.5	0.3	0.5	15
			75.8	9.4	14.7	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal
Crackers and Biscuits:						
Sandwich-type, com.	15	1	**10.8**	**0.8**	**2.9**	**75**
			72.2	5.0	19.6	
Saratoga Flakes, N. B. C.	11	3	**7.6**	**1.1**	**1.3**	**50**
			69.3	10.0	12.0	
Social tea	14	3	**11.1**	**1.2**	**1.3**	**65**
			79.4	8.2	9.9	
Soda	10	3, 2″ sq.	**7.3**	**1.0**	**1.0**	**45**
			73.1	9.8	9.1	
Soda, Loose-Wiles	7	1	**5.4**	**0.6**	**0.5**	**30**
			80.6	9.6	7.5	
Soda, N. B. C.	20	3	**15.0**	**1.5**	**1.9**	**85**
			74.9	7.3	9.4	
Soda, Sunshine	6	1	**4.4**	**0.6**	**0.7**	**25**
			75.7	9.6	12.2	
Toasted Dainties, whole wheat, N. B. C.	13	4	**10.1**	**1.3**	**1.0**	**55**
			77.3	9.6	7.4	
Uneeda Biscuit	20	3	**14.5**	**2.2**	**2.1**	**90**
			71.8	11.1	10.5	
Vanilla wafers	10	3	**7.2**	**0.6**	**1.5**	**45**
			72.4	6.1	14.9	
Water	18	2	**13.6**	**2.1**	**0.9**	**75**
			75.7	11.7	5.0	
Wheatsworth, N. B. C.	10	2	**7.6**	**0.9**	**0.9**	**45**
			75.5	8.7	9.3	
Crackels, Quaker	30	1 c.	**24.1**	**3.3**	**0.1**	**115**
			80.2	10.9	0.4	
Cranberries	50	½ c.	**4.2**	**0.2**	**0.3**	**20**
			*8.4	0.4	0.6	
Cranberry sauce	100	⅓ c.	**44.6**	**0.2**	**0.3**	**185**
			44.6	0.2	0.3	
Crayfish (Eastern)	115	¼ lb.	**1.2**	**18.4**	**0.6**	**85**
			1.0	16.0	0.5	
Crayfish, boiled	60	2 oz.		**11.6**	**0.5**	**50**
				19.3	0.8	
Cream, see Milks.						
Cream cheese, American	30	⅓ pkg.	Trace	**3.0**	**11.4**	**120**
			*0.2	10.0	38.0	
Cream cheese, English	30	2″ x 1″ x ½″	**0.4**	**1.6**	**17.4**	**170**
			*1.3	5.3	56.1	
Cream cheese, demi-sel, French	30	2″ x 1″ x ½″		**4.3**	**11.9**	**125**
				14.5	39.9	
Cream of barley	50	½ c.	**38.0**	**5.6**	**0.8**	**180**
			76.1	11.1	1.6	
Cream of rice	30	¼ c.	**23.9**	**2.2**	**0.1**	**110**
			79.6	7.4	0.4	
Cream of rye	50	⅓ c.	**35.9**	**6.0**	**0.8**	**180**
			71.8	12.0	1.6	
Cream of Wheat	30	¼ c.	**21.8**	**3.5**	**0.7**	**110**
			72.5	11.8	2.4	
Cream of Wheat, cooked	170	¾ c.	**24.7**	**3.4**	**—**	**115**
			14.5	2.0	—	
Cream of Wheat, "new 5-minute"	20	2 T.	**14.6**	**2.4**	**0.3**	**70**
			73.0	12.0	1.3	

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	Size of portion.		Value of portion.			
Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Cress, garden	20	½ c.	**0.8**	**0.8**	**0.3**	**9**
			*4.1	4.2	1.4	
Cress, water	20	½ c.	**0.8**	**0.2**	**0.2**	**6**
			4.0	1.0	1.0	
Crisco	12	1 T.	—	—	**12.0**	**110**
			—	—	100.0	
Croaker	230	½ lb.		**41.4**	**6.9**	**205**
				18.0	3.0	
Crumbs, white, dried . . .	55	½ c.	**41.8**	**7.2**	**1.1**	**210**
			76.0	13.0	2.0	
Cucumber	75	2½″ x 2″	**1.3**	**0.6**	**0.2**	**10**
			*1.7	0.8	0.2	
Cucumber, cooked	50	2 T.	**0.3**	**0.3**	—	**2**
			0.7	0.5	Trace	
Cucumber pickle, fresh, com.	20	3 sl.	**3.2**	**0.2**	—	**14**
			15.9	1.2	0.2	
Curly-kale	100	1 c.	**9.9**	**3.8**	**0.9**	**65**
			9.9	3.8	0.9	
Currant (black) jam, com. .	25	1 T.	**17.2**	**0.1**	—	**70**
			*68.8	0.5	Trace	
Currant (black) juice . . .	120	½ c.	**13.1**	**0.6**	—	**55**
			*10.9	0.5	—	
Currant (red) jelly, com. . .	12	1 t.	**7.9**	Trace	—	**30**
			*66.0	0.3	Trace	
Currant (red) juice	120	½ c.	**12.1**	**0.4**	—	**50**
			10.1	0.3	—	
Currants:						
Black	50	½ c.	**3.3**	**0.5**	—	**15**
			*6.6	0.9	Trace	
Black, stewed without sugar	80	1 c.	**2.9**	**0.5**	—	**14**
			*4.6	0.6	Trace	
Red	50	½ c.	**2.2**	**0.6**	—	**12**
			*4.4	1.1	Trace	
Red, stewed without sugar	80	1 c.	**2.6**	**0.6**	—	**13**
			*3.2	0.8	Trace	
White	50	½ c.	**2.8**	**0.7**	—	**18**
			*5.6	1.3	Trace	
Zante, dried	50	⅓ c.	**31.5**	**0.8**	—	**130**
			*63.1	1.7	—	
Curried meat	60	2 oz.	**5.2**	**4.7**	**6.7**	**105**
			*8.7	7.9	11.1	
Curry powder	0.5	⅕ t.	—	—	—	—
			*26.1	9.5	10.8	
Cushaw (squash)	125	1 c.	**9.1**	**1.5**	**0.4**	**45**
			7.3	1.2	0.3	
Custard-apple	100	1	**18.1**	**2.1**	—	**90**
			*18.1	2.1	Trace	
Custard:						
Banana	50		**8.9**	**1.2**	**1.3**	**55**
			*17.9	2.5	2.6	
Egg, baked	50		**4.7**	**2.6**	**2.9**	**55**
			*9.4	5.2	5.9	
Egg, boiled	50		**6.3**	**2.3**	**2.6**	**60**
			*12.7	4.7	5.3	
Frozen	60	2 oz.	**10.8**	**2.4**	**5.4**	**105**
			*18.0	4.0	9.0	
Pie	100	1 sl.	**27.7**	**5.5**	**14.4**	**270**
			*27.7	5.5	14.4	
Cuttlefish	115	¼ lb.	**0.8**	**16.0**	**1.7**	**85**
			*0.8	14.0	1.5	

D

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Damson plum	50	8 med.	**4.8** *9.6	**0.2** 0.5		**20**
Damson plum jam	25	1 T.	**13.3** 53.0	**0.3** 1.2	— Trace	**55**
Dandelion greens	50	½ c.	**5.3** 10.6	**1.2** 2.4	**0.5** 1.0	**30**
Dasheens	100	1 tuber	**23.5** *23.5	**2.9** 2.9	**0.2** 0.2	**110**
Date pudding, Heinz	50		**24.1** 48.2	**1.7** 3.5	**4.9** 9.9	**150**
Dates, fresh	15	3	**5.4** *35.8			**20**
Dates, dried	13	2 lg.	**9.5** *73.5	**0.2** 1.7	**0.2** 1.9	**40**
Derbyshire cheese	20	1 cu. in.	**0.9** *4.4	**4.9** 24.5	**7.0** 35.2	**90**
Dill pickles, com.	20	½ sm.	**0.1** 0.5	**0.2** 0.9	**0.1** 0.3	**2**
Dock or sorrel	25	½ c.	Trace *0.1	**0.5** 2.1	Trace 0.2	**2**
"Double" cream, see 40% cream, p. 102.						
Doughnuts	45	1, 3″ diam.	**24.0** 53.1	**3.0** 6.7	**9.5** 21.0	**200**
Dripping, beef	10	1 T.	**0** 0	**0** Trace	**9.9** 99.0	**90**
Duck, domesticated	230	½ lb.		**49.2** 21.4	**19.0** 8.2	**380**
Duck, wild	230	½ lb.		**49.0** 21.3	**12.0** 5.2	**310**
Duck gizzard	100	1 lg.	**0.6** 0.6	**21.3** 21.3	**3.7** 3.7	**125**
‡Duck, roasted	115	¼ lb.		**36.3** 31.6	**5.4** 4.7	**200**
Duck, roasted, cold	115	¼ lb.		**31.2** 27.1	**7.0** 6.1	**195**
Duck egg, see Eggs.						
Dumpling	100		**24.0** *24.0	**3.3** 3.3	**11.1** 11.1	**215**
Dutch heads (kohlrabi)	100	½ c.	**4.2** *4.2	**2.0** 2.0	**0.1** 0.1	**25**

E

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Edam cheese	30	1⅛″ cube	**1.9** *6.3	**7.1** 23.5	**10.2** 34.0	**130**
Edam cheese, American	30	1⅛″ cube		**9.2** 30.9	**6.8** 22.7	**100**
Eels, Mediterranean	230	½ lb.	**2.3** *1.0	**37.5** 16.3	**40.9** 17.8	**530**
Eels, salt water	230	½ lb.		**42.8** 18.6	**20.9** 9.1	**470**
Eels, smoked	115	¼ lb.		**21.4** 18.6	**32.0** 27.8	**385**
Eels, stewed	60	2 oz.		**6.6** 11.0	**10.9** 18.1	**130**

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Blank space indicates lack of data.

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Negligible quantity is designated by —.

E

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Eggs:						
Chinese preserved (Pidan)	100	1 lg.	**—**	**26.8**	**18.5**	**285**
			—	26.8	18.5	
Duck:						
Whole	65	1 av.	**—**	**8.6**	**9.4**	**125**
			—	13.3	14.5	
White	40	1 av.	**—**	**4.4**	**—**	**20**
			—	11.1	Trace	
Yolk	25	1 av.	**—**	**4.2**	**9.3**	**105**
			—	16.8	36.2	
Goose:						
Whole	70	1 av.	**—**	**9.7**	**9.1**	**125**
			—	13.8	14.4	
White	45	1 av.	**—**	**5.3**	**—**	**20**
			—	11.6	Trace	
Yolk	25	1 av.	**—**	**4.4**	**9.1**	**100**
			—	17.3	36.2	
Guinea-hen:						
Whole	30	1 av.	**—**	**4.1**	**3.6**	**50**
			—	13.5	12.0	
White, bulk	100			**11.6**	**—**	**50**
				11.6	Trace	
Yolk, bulk	100			**16.7**	**31.8**	**375**
				16.7	31.8	
Hen:						
Whole	50	1 av.	**—**	**6.7**	**5.2**	**75**
			—	13.4	10.5	
Pullet's egg	40	1 av.				
White	35	1 av.	**—**	**4.3**	**0.1**	**20**
			—	12.3	0.2	
Yolk	15	1 av.	**—**	**2.4**	**5.0**	**55**
			—	15.7	33.3	
Brown egg	50	1 av.	**—**	**5.9**	**5.6**	**75**
			—	11.9	11.2	
White egg	50	1 av.	**—**	**5.9**	**5.4**	**75**
			—	11.8	10.8	
Dehydrated (dried) eggs	30	1 oz.	**—**	**12.0**	**13.1**	**170**
			—	40.0	43.7	
Plover, whole	25	1 av.	**—**	**2.7**	**2.9**	**40**
			—	10.7	11.7	
Turkey:						
Whole	80	1 av.	**—**	**10.7**	**9.0**	**130**
			—	13.4	11.2	
White	50	1 av.	**—**	**5.7**	**—**	**25**
			—	11.5	Trace	
Yolk	30	1 av.	**—**	**5.1**	**8.9**	**105**
			—	17.4	32.9	
Turtle, fresh water	100		**—**	**18.1**	**11.1**	**175**
			—	18.1	11.1	
Turtle, sea water	35	1 med.	**—**	**6.6**	**3.4**	**60**
			—	18.8	9.8	
Eggs, cooked:						
Fried	100	2	**0**	**14.1**	**19.5**	**240**
			0	14.1	19.5	
Omelette	100		**—**	**7.6**	**30.3**	**315**
			—	7.6	30.3	
Poached	50	1	**0**	**6.2**	**5.8**	**80**
			0	12.4	11.7	
Scrambled	100	2	**0.6**	**10.1**	**25.2**	**280**
			*0.6	10.1	25.2	
Eggfruit	100		**41.0**	**3.4**	**1.9**	**190**
			41.0	3.4	1.9	

E

Food items	Size of portion. Grams.	Household measure	Value of portion. Carb	Prot	Fat	Cal
Eggplant	250	2 sl.	**10.8** *4.3	**3.0** 1.2	**0.8** 0.3	**65**
Eiweissmilch	240	1 c.	**3.3** *1.4	**7.2** 3.0	**5.5** 2.3	**95**
Emmenthaler cheese	30	2 cu. in.	**0.4** *1.4	**8.5** 28.4	**8.5** 28.5	**115**
Endive, chicory, leaves	15	¼ sm. head	**0.6** 4.0	**0.2** 1.6	Trace 0.2	**3**
Endive, white chicory, French	45	1 sm. crown	**1.3** 2.9	**0.7** 1.6	**0.1** 0.3	**9**
Escarole (Batavian endive)	50	½ heart	**0.5** *0.9	**0.6** 1.1	Trace 0.1	**5**
Eulachon (Columbia River smelt)	230	½ lb.		**30.4** 13.2	**25.7** 11.2	**315**

F

Food items	Grams.	Household measure	Carb	Prot	Fat	Cal
Farina	20	2 T.	**15.0** 75.0	**2.2** 11.0	**0.1** 0.5	**70**
Fats, see Oils.						
Fave beans	75	¾ c.	**3.1** 4.2	**4.0** 5.4	— —	**30**
Fave beans, dried	75	½ c.	**36.1** 48.2	**17.7** 23.6	**1.8** 2.5	**240**
Fennel	50	½ (3″ diam.)	**1.8** 3.6	**0.9** 1.9	**0.1** 0.2	**12**
Fetticus (cornsalad)	25	½ c.	**0.9** 3.6	**0.5** 2.0	**0.1** 0.4	**7**
Figs, fresh, Florida	45	1 lg.	**5.3** *11.7	**0.3** 0.6	**0.2** 0.5	**25**
Figs, candied	15	1	**11.0** 73.7	**0.5** 3.5	— 0.2	**45**
Figs, canned	85	3	**34.8** 40.9	**1.0** 1.2	**0.3** 0.3	**150**
Figs, dried	45	2 lg.	**23.8** *52.9	**1.6** 3.6	— —	**105**
Figs, Smyrna, processed	45	3	**23.1** *51.3	**1.4** 3.0	**0.2** 0.4	**100**
Fig jam	25	1 T.	**12.8** 51.2	**0.2** 0.7	— Trace	**55**
Fig pudding, Heinz	50		**24.5** 49.0	**2.0** 4.0	**6.0** 12.1	**165**
Filberts (hazelnuts), raw, unsalted	35	20	**3.3** *9.3	**5.2** 14.9	**23.0** 65.6	**250**
Filberts (hazelnuts), roasted, salted	35	20	**4.4** *12.6	**4.9** 14.1	**23.3** 66.6	**255**
Finnan haddie	230	½ lb.		**39.0** 17.0	**23.0** 10.0	**375**
Finocchio (fennel)	50	½ (3″ diam.)	**1.8** 3.6	**0.8** 1.9	**0.1** 0.2	**12**
Fish and Other Sea Food, see specific item.						

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Fish pastes, English:						
Anchovy	6	1 t.	**0.1**	**1.2**	**0.7**	**12**
			*2.5	20.6	12.1	
Bloater	6	1 t.	**0.2**	**1.2**	**0.7**	**12**
			*4.0	20.1	12.0	
Crab	6	1 t.	**0.4**	**1.1**	**0.3**	**9**
			*6.8	18.8	5.2	
Lobster	6	1 t.	**0.2**	**0.9**	**0.6**	**10**
			*3.0	15.5	9.8	
Prawn	6	1 t.		**1.3**	**0.5**	**10**
				21.6	8.6	
Salmon and anchovy	6	1 t.	**0.5**	**0.8**	**0.5**	**10**
			*8.5	14.0	9.1	
Salmon and shrimp	6	1 t.	**0.2**	**1.1**	**0.5**	**10**
			*4.2	18.2	9.3	
Sardine and tomato	6	1 t.	**0.5**	**1.1**	**0.6**	**12**
			*7.9	19.0	9.6	
Shrimp	6	1 t.	**0.1**	**1.1**	**0.7**	**11**
			*2.5	18.3	11.5	
Five-O, chocolate flavored drink, made from powder	250	1 c.	**24.2**	**4.5**	**0.7**	**125**
			9.7	1.8	0.3	
Five-O, chocolate flavored drink, made from syrup	250	1 c.	**29.5**	**4.0**	**1.5**	**150**
			11.8	1.6	0.6	
Flatbread	100		**73.6**	**14.9**	**0.5**	**365**
			73.6	14.9	0.5	
Flounder	230	½ lb.		**32.7**	**1.4**	**145**
				14.2	0.6	
Flounder, fried	115	¼ lb.	**7.5**	**19.5**	**14.8**	**250**
			*6.5	17.0	12.9	
Flours:						
Apple (Italian)	100	⅔ c.	**40.8**	**3.4**	**—**	**180**
			*40.8	3.4	—	
Arrowroot	26	2 T.	**26.0**	**—**	**—**	**105**
			100.0	—	—	
Banana or pisang	100	⅔ c.	**72.5**	**3.5**	**0.8**	**320**
			72.5	3.5	0.8	
Barley meal and flour	130	1 c.	**82.2**	**13.7**	**2.9**	**420**
			72.8	10.5	2.2	
Buckwheat (sifted)	115	1 c.	**89.6**	**7.4**	**1.4**	**410**
			77.9	6.4	1.2	
Corn	130	1 c.	**99.1**	**10.9**	**2.3**	**470**
			76.2	8.4	1.8	
Cottonseed	100		**21.3**	**49.1**	**12.7**	**405**
			21.3	49.1	12.7	
Gluten, Battle Creek Food Co.	100	¾ c.	**43.3**	**44.8**	**1.8**	**390**
			43.3	44.8	1.8	
Gluten, see also items below.						
Gold Medal, family, enriched	115	1 c. sifted	**86.8**	**12.1**	**1.2**	**405**
			75.5	10.5	1.0	
Gold Medal, phosphated, enriched	115	1 c. sifted	**86.2**	**12.1**	**1.2**	**405**
			75.0	10.5	1.0	
Gold Medal, self-rising, enriched	115	1 c. sifted	**81.6**	**11.5**	**1.2**	**385**
			71.0	10.0	1.0	
Graham, Wheatsworth, N. B. C.	100	¾ c.	**74.6**	**11.4**	**2.4**	**375**
			74.6	11.4	2.4	
Lima bean	100	1¼ c. sc.	**63.0**	**21.5**	**1.4**	**360**
			63.0	21.5	1.4	
Peanut	100	1¼ c.	**36.5**	**51.2**	**5.0**	**405**
			36.5	51.2	5.0	

F

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Flours:						
Oat	75	1 c.	**49.3**	**11.3**	**4.8**	**295**
			65.7	15.1	6.4	
Pancake, Aunt Jemima, Quaker	100	¾ c.	**71.6**	**10.4**	**1.5**	**350**
			71.6	10.4	1.5	
Pancake, Pillsbury	100	¾ c.	**76.0**	**7.9**	**1.2**	**355**
			*76.0	7.9	1.2	
Pancake, Sperry	140	1 c.	**104.7**	**11.9**	**1.7**	**480**
			74.8	8.5	1.2	
Pillsbury's Best	100	1 c.	**75.0**	**11.2**	**1.0**	**365**
			*75.0	11.2	1.0	
Pisang (banana)	100	⅔ c.	**72.5**	**3.5**	**0.8**	**320**
			72.5	3.5	0.8	
Potato	100	⅔ c.	**83.0**	**0.5**	**0.1**	**345**
			83.0	0.5	0.1	
Prepared soy gluten casein, Loeb	100	1 c.	**26.0**	**42.0**	**11.0**	**380**
			*26.0	42.0	11.0	
Pure gluten, Loeb	100	¾ c.	**43.0**	**41.0**	**2.0**	**365**
			*43.0	41.0	2.0	
Rice	100	⅔ c.	**68.0**	**8.6**	**6.1**	**370**
			68.0	8.6	6.1	
Rye, whole-grain	100	1⅓ c.	**75.2**	**11.2**	**1.7**	**370**
			75 2	11.2	1.7	
Rye, light, Pillsbury	100	1 c.	**78.7**	**9.9**	**1.4**	**375**
			*78.7	9.9	1.4	
Rye, medium, Pillsbury	90	1 c.	**69.0**	**9.5**	**1.3**	**335**
			*76.6	10.4	1.5	
Rye, dark, Pillsbury	100	1⅓ c.	**70.6**	**15.4**	**2.6**	**375**
			*70.6	15.4	2.6	
Self-rising gluten, Loeb	100	¾ c.	**40.0**	**38.0**	**2.0**	**340**
			*40.0	38.0	2.0	
Self-rising, Wheatsworth, N. B. C.	100	¾ c.	**67.9**	**12.3**	**2.1**	**350**
			67.9	12.3	2.1	
Sno Sheen cake	100	1 c.	**78.5**	**7.8**	**1.1**	**365**
			*78.5	7.8	1.1	
Softasilk cake	100	1 c.	**73.5**	**7.5**	**0.9**	**340**
			73.5	7.5	0.9	
Soya	100	1 c.	**15.6**	**46.7**	**2.7**	**280**
			*15.6	46.7	2.7	
Soy bean	100	1 c.	**8.0**	**45.0**	**11.0**	**320**
			8.0	45.0	11.0	
Soy, Battle Creek Food Co.	100	1 c.	**33.4**	**33.6**	**21.3**	**475**
			33.4	33.6	21.3	
Swans Down cake	100	1 c.	**78.2**	**7.6**	**0.8**	**360**
			78.2	7.6	0.8	
Wheat, patent	100	¾ c.	**75.9**	**10.8**	**0.9**	**360**
			75 9	10 8	0 9	
Wheat, patent, enriched	100	¾ c.	**75.9**	**10.8**	**0.9**	**360**
			75 9	10 8	0.9	
Wheat, self-rising	115	1 c.	**83.8**	**11.7**	**1.0**	**400**
			72 9	10 2	0 9	
Wheat, self-rising, enriched	115	1 c.	**83.8**	**11.7**	**1.0**	**400**
			72 9	10 2	0 9	
Whole wheat, *Gold Medal*	130	1 c.	**89.1**	**18.2**	**2.6**	**455**
			68 5	14 0	2 0	
Whole wheat, Pillsbury	100	¾ c.	**70.8**	**13.4**	**2.0**	**365**
			*70.8	13.4	2.0	
Flying fish, Mediterranean	115	¼ lb.	**1.3**	**22.1**	**1.3**	**110**
			1.1	19.2	1.1	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

F

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
"*Force*," whole wheat flakes	30	1 c.	**23.8**	**3.4**	**0.3**	**115**
			*79.5	11.4	1.1	
Fowl, see specific item.						
Frankfort sausage (Frankfurter)	120	2, 7″ x ¾″	**1.3**	**23.5**	**22.3**	**310**
			1.1	19.6	18.6	
Frankfurter, all meat	120	2, 7″ x ¾″		**16.9**	**25.0**	**300**
				14.1	20.8	
Frankfurter, added cereal	120	2, 7″ x ¾″	**18.2**	**16.9**	**4.0**	**180**
			15.2	14.1	3.3	
French salad dressing	11	2 t.	—	—	**6.6**	**60**
			—	—	60.0	
French salad dressing, com.	11	2 t.	**2.0**	**0.1**	**3.9**	**45**
			*18.1	0.6	35.5	
Frogs' legs	230	½ lb.		**35.7**	**0.5**	**150**
				15.5	0.2	
Fromage de Brie, American	25	1½″ x 1″ x ¾″	**0.4**	**4.0**	**5.3**	**65**
			*1.4	15.9	21.0	
Fromage de Brie, European	25	1½″ x 1″ x ¾″		**5.2**	**5.6**	**125**
				20.9	22.4	
Frozen custard	60	2 oz.	**10.8**	**2.4**	**5.4**	**105**
			*18.0	4.0	9.0	
Frozen foods, same analyses as raw products.						
Fruit cake, dark	60	1 sl.	**33.5**	**3.1**	**8.3**	**230**
			55.9	5.2	13.8	
Fruit cake, dark, N. B. C.	60	1 sl.	**37.8**	**2.9**	**8.3**	**245**
			63.0	4.8	13.8	
Fruit cake, light, N. B. C.	60	1 sl.	**39.0**	**2.6**	**7.5**	**240**
			65.0	4.4	12.5	
Fruit salad, see Fruits, canned.						
Fruit syrups, com.	15	1 T.	**7.5**	—	**0**	**30**
			*50.0	0.1	0	
Fruits, Canned:† Refer also to specific item.						
Apricots, fancy	120	½ c.	**66.0**	**0.6**	—	**275**
		3 halves	55.0	0.5	—	
Apricots, choice	120	½ c.	**48.0**	**0.7**	—	**200**
		4 halves	40.0	0.6	—	
Apricots, standard	120	½ c.	**30.0**	**0.8**	—	**125**
		3 halves	25.0	0.7	—	
Apricots, light syrup	120	½ c.	**20.8**	**1.1**	—	**90**
			17.3	0.9	—	
Blackberries, extra heavy syrup	120	¾ c.	**67.7**	**1.0**	—	**280**
			56.4	0.8	–	
Blackberries, fancy	120	¾ c.	**48.0**	**1.0**	—	**200**
			40.0	0.8	—	

† **General description of grades of canned fruits: Fancy**—the top grade; fruit of superlative quality packed in extra heavy syrup ranging from 40 to 70 per cent. **Choice**—the grade between the top and standard grades; fruit of fine quality packed in heavy syrup containing 10 to 15 per cent less sugar. **Standard**—the medium grade; fruit of good quality packed in medium syrup of about 20 to 25 per cent. **Second**—fruit of second quality packed in 10 per cent syrup; when packed in water, this fruit is often designated **water**; when for bakery use, it may be designated **pie** and **solid packed pie**.

Heavy syrup is used on apricots, peaches, and plums, and, beginning with 10 per cent sugar by weight on Seconds, increases in steps of 15 per cent to each grade. **Light syrup** is used on pears, cherries, and grapes, and, beginning with 10 per cent sugar by weight on Seconds, increases in steps of 10 per cent to each grade.

All carbohydrate percentages represent added syrup; available carbohydrate in the fruit itself is negligible by comparison where the syrup is 20 per cent or more. **All protein percentages are approximate.**

F

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb	Prot.	Fat.	Cal.
Fruits, Canned†:						
Blackberries, choice . .	120	¾ c.	**36.0**	**1.1**	**—**	**150**
			30.0	0.9	—	
Blackberries, standard .	120	¾ c.	**24.0**	**1.1**	**—**	**105**
			20.0	0.9	—	
Blueberries, fancy . .	120	½ c.	**72.0**	**0.5**	**—**	**295**
			60.0	0.4	—	
Blueberries, choice . .	120	½ c.	**48.0**	**0.6**	**—**	**200**
			40.0	0.5	—	
Blueberries, standard .	120	½ c.	**24.0**	**0.7**	**—**	**100**
			20.0	0.6	—	
Blueberries, very light syrup	120	½ c.	**15.4**	**0.7**	**—**	**65**
			12.8	0.6	—	
Cherries:						
Fancy[1]	85	½ c., 12	**34.0**	**0.4**	**—**	**125**
			40.0	0.5	—	
Choice[1]	85	½ c., 15	**25.5**	**0.5**	**—**	**105**
			30.0	0.6	—	
Standard[1]	85	½ c., 20	**17.0**	**0.5**	**—**	**70**
			20.0	0.6	—	
Red, pitted, fancy . .	100	½ c.	**70.0**	**0.2**	**—**	**290**
			70.0	0.2	—	
Red, pitted, choice .	100	½ c.	**50.0**	**0.2**	**—**	**205**
			50.0	0.2	—	
Red, pitted, standard .	100	½ c.	**30.0**	**0.3**	**—**	**125**
			30.0	0.3	—	
Figs	85	½ c., 3	**34.8**	**1.0**	**0.3**	**150**
			40.9	1.2	0.3	
Fruit salad, fancy . .	140	1 c.	**33.6**	**0.7**	**—**	**140**
			24.0	0.5	—	
Fruit salad, choice . .	140	1 c.	**28.0**	**0.7**	**—**	**120**
			20.0	0.5	—	
Grapefruit	135	¾ c.	**17.1**	**0.7**	**0.3**	**75**
			12.7	0.5	0.2	
Grapes, Muscat, fancy .	120	½ c.	**48.0**	**0.6**	**—**	**200**
			40.0	0.5	—	
Grapes, Muscat, choice .	120	½ c.	**36.0**	**0.6**	**—**	**150**
			30.0	0.5	—	
Grapes, Muscat, standard	120	½ c.	**24.0**	**0.7**	**—**	**100**
			20.0	0.6	—	
Loganberries	75	¾ c.	**21.0**	**0.5**	**—**	**90**
			28.0	0.7	—	
Peaches, fancy . . .	140	2 halves	**77.0**	**0.5**	**—**	**320**
			55.0	0.3	—	
Peaches, choice . . .	140	2 halves	**56.0**	**0.6**	**—**	**230**
			40.0	0.4	—	
Peaches, standard . .	140	3 halves	**35.0**	**0.7**	**—**	**145**
			25.0	0.5	—	
Pears, Bartlett, fancy .	120	2 halves	**48.0**	**0.2**	**—**	**200**
			40.0	0.2	—	
Pears, Bartlett, choice .	120	2 halves	**36.0**	**0.3**	**—**	**150**
			30.0	0.3	—	
Pears, Bartlett, standard .	120	3 halves	**24.0**	**0.5**	**—**	**100**
			20.0	0.4	—	
Pineapple, heavy syrup .	150	2 sl.	**54.6**	**0.6**	**1.1**	**235**
			36.4	0.4	0.7	
Pineapple, medium syrup	150	2 sl.	**37.5**	**0.6**	**1.1**	**165**
			25.0	0.4	0.7	
Pineapple, light syrup .	150	2 sl.	**22.5**	**0.6**	**0.2**	**95**
			15.0	0.4	0.1	

[1] Black, white and Royal Anne cherries.
† See footnote on page 85.
* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —

F

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Fruits, Canned†:						
Plums, fancy	100	2, ½ c.	**55.0**	**0.3**	**—**	**225**
			55.0	0.3	—	
Plums, choice	100	2, ½ c.	**40.0**	**0.4**	**—**	**165**
			40.0	0.4	—	
Plums, standard	100	3, ½ c.	**25.0**	**0.5**	**—**	**105**
			25.0	0.5	—	
Prunes	100	3	**22.3**	**0.5**	**0.1**	**95**
			22.3	0.5	0.1	
Raspberries:						
Black, fancy	140	⅔ c.	**56.0**	**1.3**	**1.3**	**245**
			40.0	0.9	0.9	
Black, choice	140	⅔ c.	**42.0**	**1.4**	**1.4**	**190**
			30.0	1.0	1.0	
Black, standard	140	⅔ c.	**28.0**	**1.5**	**1.5**	**135**
			20.0	1.1	1.1	
Red, fancy	140	⅔ c.	**84.0**	**0.8**	**—**	**350**
			60.0	0.6	—	
Red, choice	140	⅔ c.	**56.0**	**1.0**	**—**	**235**
			40.0	0.7	—	
Red, standard	140	⅔ c.	**28.0**	**1.1**	**—**	**120**
			20.0	0.8	—	
Strawberries	120	⅔ c.	**33.6**	**0.5**	**0**	**140**
			28.0	0.4	0	
Fruits, Dried:						
Apples	60	⅛ lb.	**39.7**	**1.0**	**1.3**	**180**
			66.1	1.6	2.2	
Apricots	25	6 halves	**10.8**	**1.2**	**0.3**	**50**
			*43.4	4.7	1.0	
Currants, Zante	50	⅓ c.	**31.5**	**0.8**	**—**	**130**
			*63.1	1.7	—	
Dates	13	2 lg.	**9.5**	**0.2**	**0.2**	**40**
			*73.5	1.7	1.9	
Figs	45	2 lg.	**23.8**	**1.6**	**—**	**105**
			*52.9	3.6	—	
Litchi	25	10 (large pits)	**17.5**	**0.9**	**0.1**	**75**
		8 (small pits)	70.0	3.6	0.5	
Peaches	50	3, 1¾″ diam.	**26.5**	**1.7**	**—**	**115**
			*53.0	3.4	—	
Pears	75	4 halves	**27.0**	**1.7**	**0.3**	**120**
			*36.0	2.3	0.4	
Prunes	100	8 lg.	**40.3**	**2.4**	**—**	**175**
			*40.3	2.4	—	
Raisins, Muscat, seeded	75	½ c.	**48.3**	**0.8**	**—**	**200**
			*64.4	1.1	—	
Raisins, Sultana or Thompson seedless	60	⅓ c.	**38.8**	**1.0**	**—**	**165**
			*64.7	1.7	—	
Raspberries	40	¼ c.	**32.1**	**2.9**	**0.7**	**150**
			80.2	7.3	1.8	
Fruits, Glacé:						
Apricots	20	1 med.	**17.3**	**—**	**—**	**70**
			86.5	0.6	0.2	
Cherries	10	3	**5.6**	**—**	**0**	**25**
			*55.8	0.6	0	
Figs	15	1	**11.0**	**0.5**	**—**	**45**
			73.7	3.5	0.2	
Pears	30	1 oz.	**22.8**	**0.4**	**0.2**	**95**
			75.9	1.3	0.6	
Pineapple	50	1 sl.	**40.0**	**0.4**	**0.2**	**165**
			80.0	0.8	0.4	
Fruit Juices:						
Apple	120	½ c.	**15.0**	**0.1**	**—**	**60**
			12.5	0.1	—	

† See footnote on page 85.

F

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Fruit, Juices:						
Blackberry	120	½ c.	**8.4**	**0.4**	—	**35**
			7.0	0.3	—	
Blueberry	120	½ c.	**14.9**	**0.1**	—	**60**
			*12.4	0.1	—	
Carambola	225	1 c.	**23.2**	**0.2**	**0.2**	**100**
			10.3	0.1	0.1	
Cider, sweet apple	230	1 c.	**32.7**	**0.2**	**0**	**135**
			*14.2	0.1	0	
Citrang	120	½ c.	**8.3**	**1.5**	—	**40**
			6.9	1.3	—	
Crab apple	120	½ c.	**13.4**	—	—	**55**
			*11.2	—	—	
Currant, black	120	½ c.	**13.1**	**0.6**	—	**60**
			*10.9	0.5	—	
Currant, red	120	½ c.	**12.0**	**0.4**	—	**50**
			10.1	0.3	—	
Granadilla	30	1 oz.	**5.7**	**0.2**	—	**25**
			19.1	0.6	—	
Grape:						
Catawba type	120	½ c.	**24.2**	**0.5**	—	**105**
			20.2	0.4	—	
Concord	120	½ c.	**20.8**	**0.4**	—	**85**
			17.3	0.3	—	
Delaware	120	½ c.	**26.5**	**0.4**	—	**110**
			22.1	0.3	—	
Muscadine	120	½ c.	**15.6**	**0.1**	—	**65**
			13.0	0.1	—	
Welch, certified	120	½ c.	**18.1**	**0.4**	—	**75**
			15.1	0.3	—	
Grapefruit, California	120	½ c.	**11.5**	**0.5**	**0.1**	**50**
			9.8	0.4	0.1	
Grapefruit, Florida	120	½ c.	**15.2**	**0.6**	**0.2**	**65**
			12.7	0.5	0.2	
Lemon	15	1 T.	**1.5**	—	—	**6**
			9.8	—	—	
Lime	15	1 T.	**1.2**	**0.1**	—	**5**
			7.8	0.5	—	
Limequat	15	1 T.	**1.0**			**4**
			*6.8			
Loganberry	120	½ c.	**12.1**	**0.7**	—	**65**
			10.1	0.6	—	
Muskmelon	120	½ c.	**10.9**		—	**45**
			*9.1		—	
Orange, California	120	½ c.	**15.7**	**0.7**	—	**65**
			13.1	0.6	—	
Passion fruit, natural	30	1 oz.	**3.5**	**0.4**		**15**
			*11.5	1.4		
Peach	120	½ c.	**15.4**	**0.2**	—	**65**
			12.8	0.2	—	
Pineapple	120	½ c.	**15.4**	**0.4**	**0.4**	**70**
			12.8	0.3	0.3	
Pineapple, Hawaiian	120	½ c.	**15.9**	**0.4**	**0.4**	**70**
			*13.3	0.3	0.3	
Pomegranate juice	120	½ c.	**13.9**	**0.2**	—	**60**
			*11.6	0.2	—	
Prune	120	½ c.	**34.6**	**1.0**	**0**	**145**
			28.8	0.8	0	
Quince	120	½ c.	**10.9**	**0.4**	—	**50**
			*9.1	0.3	—	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

F

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Fruit Juices:						
Raspberry, black	120	½ c.	**12.8**	**0.2**	**—**	**55**
			10.7	0.2	—	
Raspberry, red	120	½ c.	**10.0**	**0.5**	**—**	**45**
			8.3	0.4	—	
Strawberry	120	½ c.	**6.1**	**0.2**	**—**	**25**
			5.1	0.2	—	
Tangelo	120	½ c.	**10.8**	**0.8**	**—**	**50**
			9.0	0.7	—	
Tangerine	120	½ c.	**10.0**	**1.1**	**0.4**	**50**
			9.2	0.9	0.3	

G

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Gammelost cheese, Norwegian	30	1 oz.	**2.9**	**12.6**	**1.0**	**70**
			*9.8	42.1	3.4	
Garlic	—	1 clove	**—**	**—**	**—**	**—**
			20.0	4.4	0.2	
Gefüllter fisch	60	⅛ lb.	**3.1**	**9.6**	**5.6**	**105**
			5.1	16.0	9.4	
Gelatin	3	1 t.	**—**	**2.7**	**—**	**10**
			—	91.4	0.1	
Gelatine, Knox, Sparkling	7	1 pkg.	**0**	**6.0**	**—**	**25**
			0	85.5	Trace	
Gerber Baby Foods, see page 142. 146, 147.						
Ginger ale	225	1 c.	**36.0**	**—**	**—**	**150**
			16.0	—	—	
Ginger ale, Canada Dry	225	1 c.	**20.3**	**—**	**—**	**85**
			9.0	—	—	
Ginger, crystallized	25	1 sm. piece	**21.9**	**—**	**—**	**90**
			87.5	—	—	
Ginger, ground	100		**60.0**	**7.4**	**0.4**	**280**
			*60.0	7.4	0.4	
Ginger roots	100		**9.8**	**1.8**	**1.5**	**60**
			*9.8	1.8	1.5	
Ginger snaps	30	8, 1½″ diam.	**22.8**	**2.0**	**2.6**	**155**
			76.0	6.5	8.6	
Gingerbread	60	1 sq.	**30.8**	**2.5**	**7.1**	**205**
			51.4	4.2	11.9	
Gizzard, fresh:						
Chicken	75	1 med.	**0.5**	**17.3**	**2.8**	**100**
			0.6	23.1	3.8	
Duck	100		**0.6**	**21.3**	**3.7**	**125**
			0.6	21.3	3.7	
Goose	100		**0**	**21.4**	**5.3**	**135**
			0	21.4	5.3	
Turkey	100		**1.3**	**20.5**	**10.6**	**190**
			1.3	20.5	10.6	
Gloucester cheese	20	1 cu. in.	**0.9**	**5.6**	**5.6**	**80**
			*4.4	28.0	28.0	
Glucose, com.	16	1 T.	**14.4**	**—**	**—**	**60**
			*90.0	—	—	
Gluten flour, see Flours.						
Goat's milk	240	1 c.	**9.1**	**9.6**	**10.1**	**170**
			*3.8	4.0	4.2	
Goat's milk, evaporated, Meyenberg	15	1 T.	**1.3**	**1.0**	**1.0**	**20**
			*8.8	7.0	7.1	
Goat's milk cheese, French	30	1 oz.	**4.6**	**10.0**	**7.7**	**130**
			*15.3	33.6	25.9	
Goat's milk cheese, Norwegian	30	1 oz.	**14.0**	**2.2**	**5.9**	**120**
			*46.8	7.6	19.9	

G

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Goose, young	230	½ lb.		**37.5**	**83.3**	**940**
				16.3	36.2	
Goose, roast	115	¼ lb.		**32.2**	**25.8**	**370**
				28.0	22.4	
Goose egg, see Eggs.						
Goose gizzard	100	1 med.		**21.4**	**5.3**	**135**
				21.4	5.3	
Goose liver	100	2 med.	**3.7**	**16.6**	**15.9**	**230**
			3.7	16.6	15.9	
Gooseberries, green	100	¾ c.	**3.4**	**1.1**	**—**	**20**
			*3.4	1.1	—	
Gooseberries, ripe	100	¾ c.	**9.2**	**0.6**	**—**	**40**
			*9.2	0.6	—	
Gooseberries, canned, water pack	120	½ c.	**7.2**	**0.6**	**0.2**	**35**
			6.0	0.5	0.2	
Gooseberries, canned, in syrup	120	½ c.	**22.2**	**0.6**	**0.2**	**95**
			18.5	0.5	0.2	
Gooseberry pie	100	1 sl.	**31.0**	**2.8**	**9.4**	**225**
			*31.0	2.8	9.4	
Gorgonzola cheese	15	1″ x ½″ x 2½″	**0.2**	**4.2**	**5.2**	**65**
			*1.6	28.2	34.7	
Gouda cheese, American	30	1 oz.		**8.8**	**7.3**	**105**
				29.6	24.5	
Gouda cheese, Hollander	30	1 oz.		**8.1**	**8.8**	**115**
				27.0	29.4	
Goya cheese	30	1 oz.	**0.3**	**10.3**	**9.1**	**130**
			*1.4	34.2	30.4	
Graham crackers	25	3, 3″ sq.	**18.5**	**2.5**	**2.4**	**110**
			73.8	10.0	9.4	
Graham flour, Wheatsworth, N. B. C.	100	¾ c.	**74.6**	**11.4**	**2.4**	**375**
			74.6	11.4	2.4	
Graham or whole wheat bread	25	1 sl.	**12.0**	**2.4**	**0.9**	**65**
			48.0	9.5	3.5	
Grapes, black	100	20	**15.5**	**0.6**	**—**	**65**
			*15.5	0.6	—	
Grapes, Concord	100	24	**14.9**	**1.4**	**1.4**	**70**
			14.9	1.4	1.4	
Grapes, Malaga	100	15	**16.7**	**0.8**	**0.4**	**75**
			16.7	0.8	0.4	
Grapes, white	100	30	**16.1**	**0.6**	**—**	**70**
			*16.1	0.6	—	
Grapes, canned, see Fruits, canned.						
Grape butter	35	2 T.	**20.5**	**0.4**	Trace	**85**
			58.5	1.2	0.1	
Grape juice:						
Catawba type	120	½ c.	**24.2**	**0.5**	**—**	**105**
			20.2	0.4	—	
Concord	120	½ c.	**20.8**	**0.4**	**—**	**85**
			17.3	0.3	—	
Delaware	120	½ c.	**26.5**	**0.4**	**—**	**110**
			22.1	0.3		
Muscadine	120	½ c.	**15.6**	**0.1**	**—**	**65**
			13.0	0.1	—	
Welch, certified	120	½ c.	**18.1**	**0.4**	**—**	**75**
			15.1	0.3	—	
Grapefruit	100	½, 4″ diam.	**5.3**	**0.6**	**—**	**25**
			*5.3	0.6	—	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —

G

Food items	Size of portion.		Value of portion.			
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Grapefruit, canned, water pack	135	¾ c.	**10.8**	**0.7**	**0.3**	50
			8.0	0.5	0.2	
Grapefruit, canned, juice pack	135	¾ c.	**12.2**	**0.7**	**0.3**	55
			9.0	0.5	0.2	
Grapefruit, canned, in syrup	135	¾ c.	**18.2**	**0.7**	**0.3**	75
			13.5	0.5	0.2	
Grapefruit juice, canned, unsweetened	120	½ c.	**10.2**	**0.5**	**0.1**	45
			*8.5	0.4	0.1	
Grapefruit juice, canned, sweetened	120	½ c.	**16.8**	**0.5**	**0.1**	70
			*14.0	0.4	0.1	
Grapefruit peel, candied	10	1 sm. piece	**8.1**	**—**	**—**	35
			80.6	0.4	0.3	
Grape-Nuts, Post	30	¼ c.	**24.9**	**3.2**	**0.2**	115
			83.2	10.6	0.6	
Grape-Nuts Flakes, Post	30	1 c.	**23.2**	**3.5**	**0.4**	115
			77.3	11.7	1.2	
Green beans, canned	100	½ c.	**3.4**	**1.2**	**0.1**	20
			3.4	1.2	0.1	
Green beans, see also beans, string						
Greengage plums	50	3 med.	**5.9**	**0.4**	**—**	25
			*11.8	0.8	—	
Greens, cooked:						
Beet	135	½ c.	**4.3**	**3.0**	**—**	30
			3.2	2.2	—	
Broccoli	100	½ c.	**3.7**	**3.0**	**0.1**	30
			3.7	3.0	0.1	
Chard	100	⅔ c.	**3.0**	**2.4**	**0.2**	25
			3.0	2.4	0.2	
Collards	100	½ c.	**5.0**	**3.5**	**0.5**	40
			5.0	3.5	0.5	
Kale	100	½ c.	**4.0**	**1.8**	**0.3**	25
			4.0	1 8	0.3	
Sea-kale (sea-cabbage)	100	½ c.	**0.3**	**0 4**	**0.1**	4
			0.3	0.4	0.1	
Spinach	100	½ c.	**0.8**	**2.0**	**0.2**	15
			0.8	2.0	0.2	
Turnip tops	100	½ c.	**3.0**	**2.0**	**0.2**	20
			3.0	2.0	0.2	
Greens, salad:						
Borage	75	1½ c.	**0.2**	**2.1**	**0.3**	12
			*0.3	2.8	0.4	
Chicory or endive	15	¼ sm. head	**0.6**	**0.2**	Trace	3
			4.0	1.6	0.2	
Chicory, Italian	20	½ c.	**0.2**	**0.4**	**0.1**	3
			0.8	1.9	0.4	
Cornsalad	25	½ c.	**0.9**	**0.5**	**0.1**	7
			3.6	2.0	0.4	
Dandelion	50	½ c.	**5.3**	**1.2**	**0.5**	30
			10.6	2.4	1.0	
Escarole	50	⅓ heart	**0.5**	**0.6**	Trace	5
			*0 9	1.1	0.1	
Garden cress	20	½ c.	**0.8**	**0.8**	**0.3**	9
			*4.1	4 2	1.4	
Lettuce	50	2 lg. leaves	**0.5**	**0.6**	**0.2**	6
			*1.0	1.2	0.3	
Mustard	50	½ c.	**2.0**	**1.2**	**0.2**	15
			4.0	2.3	0.3	
Mustard and cress	20	½ c.	**0.2**	**0.3**	**—**	2
			*0.9	1.6	—	
Purslane	100		**2.5**	**1.6**	**0.4**	20
			*2.5	1.6	0.4	

G

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Greens, salad:						
Romaine	50	5 leaves	1.5	0.5	—	8
			3.0	1.0	—	
Roquette	100		0.3	0.7	0.4	8
			*0.3	0.7	0.4	
Sorrel or dock	25	½ c.	Trace	0.5	Trace	2
			*0.1	2.1	0.2	
Turnip	50	½ c.	3.2	2.1	0.3	25
			6.3	4.2	0.6	
Watercress	20	½ c.	0.1	0.6	—	3
			*0.7	2.9	—	
Grits, Hominy	50	¼ c.	39.0	4.4	0.3	180
			77.9	8.8	0.6	
Groats, Robinson's Patent	9	1 T.	6.4	1.1	0.5	35
			*71.5	12.4	6.0	
Grouper, red	230	½ lb.		44.4	1.4	195
				19.3	0.6	
Grouse, roast	115	¼ lb.		34.6	6.0	200
				30.1	5.3	
Gruyère cheese	30	2″ x 1″ x 1″	1.4	9.9	8.4	125
			*4.8	33.0	28.2	
Guava, common	15	1 sm.	2.6	0.2	0.1	12
			17.1	1.0	0.6	
Guava, common, Fla.	15	1 sm.	0.7	0.1	0.1	4
			*4.8	0.8	0.6	
Guava, strawberry	15	2 sm.	2.7	0.2	0.1	13
			18.2	1.2	0.6	
Guinea hen	230	½ lb.		53.1	15.0	360
				23.1	6.5	
Guinea hen, roast	115	¼ lb.		37.4	9.4	240
				32.5	8.2	
Guinea hen egg, see Eggs.						
Gumbo (okra)	50	7, 2½″ pods	2.0	0.8	0.1	12
			*4.0	1.6	0.2	
Gumbo soup, Creole, canned	250	1 c.	7.5	1.8	0.7	45
			3.0	0.7	0.3	

H

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Haddock	230	½ lb.		39.6	0.7	170
				17.2	0.3	
Haddock, fresh, fried	115	¼ lb.	4.1	23.5	9.5	200
			*3.6	20.4	8.3	
Haddock, steamed	115	¼ lb.		28.3	0.3	120
				24.6	0.3	
Haddock, smoked	115	¼ lb.		26.8	0.2	110
				23.3	0.2	
Haddock, smoked, steamed	115	¼ lb.		25.6	1.0	115
				22.3	0.9	
Hake	230	½ lb.		35.4	1.6	160
				15.4	0.7	
Hake, fried	115	¼ lb.	6.0	22.2	13.1	235
			*5.3	19.3	11.4	
Hake, steamed	115	¼ lb.		21.3	3.8	125
				18.5	3.3	
Halibut, cooked	115	¼ lb.		23.5	4.6	140
				20.4	4.0	
Halibut, smoked	115	¼ lb.		23.9	17.3	260
				20.8	15.0	
Halibut steak	230	½ lb.		42.8	12.0	290
				18.6	5.2	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Halibut, steamed	115	¼ lb.		**27.7**	**1.9**	**130**
				24.1	1.7	
Haliver oil (P. D. & Co.)	2.4	½ t.	**0**	**0**	**2.4**	**20**
			0	0	100.0	
Haliver oil (P. D. & Co.)	0.7	20 drops	**0**	**0**	**0.7**	**6**
			0	0	100.0	
Ham:						
Fresh, lean	230	½ lb.		**57.5**	**33.1**	**545**
				25.0	14.4	
Fresh, medium	230	½ lb.		**35.2**	**66.5**	**770**
				15.3	28.9	
‡Baked or boiled	115	¼ lb.		**30.4**	**5.6**	**175**
				26.4	4.9	
‡Broiled	115	¼ lb.		**33.0**	**5.0**	**180**
				28.7	4.3	
Deviled	20	1 T.		**3.8**	**6.8**	**80**
				19.0	34.1	
‡Smoked, boiled	33	1 sl.	**—**	**7.3**	**6.8**	**95**
			—	22.1	20.6	
Smoked, lean	230	½ lb.		**25.5**	**47.8**	**630**
				19.8	20.8	
Smoked, medium	230	½ lb.		**37.5**	**89.2**	**995**
				16.3	38.8	
‡Smoked, parboiled and baked	115	¼ lb.		**32.2**	**4.4**	**175**
				28.0	3.8	
Hand cheese, Mainz	30	2 cu. in.		**11.2**	**1.7**	**55**
				37.3	5.6	
Hare, roast	115	¼ lb.		**35.9**	**8.0**	**225**
				31.2	7.0	
Haricots (beans), cooked	125	½ c.	**20.7**	**8.2**	**—**	**120**
			*16.6	6.6	Trace	
Flageolets, canned	130	½ c.	**14.9**	**5.9**	**0.1**	**85**
			*11.5	4.6	0.1	
Verts, canned	130	⅔ c.	**2.6**	**1.4**	**0.1**	**15**
			*2.0	1.1	0.1	
Haws, scarlet	20	10 med.	**3.7**	**0.4**	**0.1**	**20**
			*18.7	2.0	0.6	
Hazelnuts (filberts), raw, unsalted	35	20	**3.3**	**5.2**	**23.0**	**250**
			*9.3	14.9	65.6	
Hazelnuts (filberts), roasted, salted	35	20	**4.4**	**4.9**	**23.3**	**255**
			*12.6	14.1	66.6	
Head cheese	115	¼ lb.		**17.2**	**23.3**	**285**
				15.0	20.3	
Heart, fresh:						
Beef, lean	115	¼ lb.	**0.8**	**19.4**	**4.3**	**125**
			0.7	16.9	3.7	
Beef, lean with visible fat	115	¼ lb.	**0.1**	**17.7**	**23.8**	**295**
			0.1	15.4	20.7	
Chicken	30	1 med.	**0.5**	**6.2**	**2.1**	**45**
			1.6	20.5	7.0	
Pork	115	¼ lb.	**0.5**	**19.4**	**5.5**	**135**
			0.4	16.9	4.8	
Sheep	115	¼ lb.	**1.2**	**19.3**	**11.0**	**185**
			1.0	16.8	9.6	
Turkey	30	1 oz.	Trace	**4.9**	**3.8**	**55**
			0.2	16.2	12.7	
Veal	115	¼ lb.	**0.9**	**17.7**	**8.2**	**155**
			0.8	15.4	7.1	
Heart, cooked:						
Sheep, roast	60	2 oz.		**15.0**	**8.8**	**145**
				25.0	14.7	

Heinz Baby Foods, see pages 143, 146, 147.

H

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Herring, lake	100	1 sm.		**19.0**	**3.0**	**105**
				19.0	3.0	
Sea	100	1 sm.		**19.0**	**11.0**	**180**
				19.0	11.0	
Salted	100	1 sm.		**19.6**	**11.3**	**185**
				19.6	11.3	
Baked in vinegar	100	1 sm.		**16.9**	**12.9**	**190**
				16.9	12.9	
Fried	100	1 sm.	**1.5**	**21.8**	**15.1**	**235**
			*1.5	21.8	15.1	
Canned	115	¼ lb.		**23.8**	**14.3**	**230**
				20.7	12.4	
Canned in tomato sauce	115	¼ lb.	**4.2**	**18.2**	**12.1**	**205**
			3.7	15.8	10.5	
Pickled	60	⅛ lb.		**15.0**	**11.8**	**170**
				25.0	19.7	
Smoked:						
Bloaters	115	¼ lb.		**22.6**	**15.4**	**235**
				19.7	13.6	
Hard	50	2½″ sq.		**18.5**	**7.9**	**150**
				36.9	15.8	
Herring, smoked:						
Kippered	115	¼ lb.		**26.2**	**18.8**	**170**
				22.8	16.3	
Roe, fried	60	2 oz.	**2.8**	**14.0**	**9.5**	**155**
			*4.7	23.4	15.8	
Hickory nuts	35	¼ c.	**4.0**	**5.4**	**23.6**	**260**
			11.4	15.4	67.4	
Holland rusk	15	1	**10.5**	**1.8**	**0.7**	**55**
			70.4	12.1	5.1	
Hollandaise sauce	40	2 T.	**—**	**1.0**	**17.5**	**165**
			—	2.5	43.8	
Hominy:						
Raw	50	¼ c.	**39.5**	**4.2**	**0.3**	**180**
			79.0	8.3	0.6	
Hecker's cream	50	¼ c.	**38.6**	**4.9**	**0.2**	**180**
			77.3	9.8	0.4	
Parched	45	¼ c.	**32.5**	**5.2**	**3.8**	**190**
			72.3	11.5	8.4	
Pearl, Quaker	50	¼ c.	**38.6**	**4.6**	**0.5**	**180**
			77.2	9.1	1.0	
Cooked	200	1 sc. c.	**28.0**	**4.0**	**—**	**130**
			14.0	2.0	—	
Hominy Grits, Quaker	50	⅓ c.	**38.5**	**5.0**	**0.3**	**180**
			77.0	9.9	0.7	
Hominy Grits, Pillsbury	50	⅓ c.	**39.0**	**4.4**	**0.3**	**180**
			77.9	8.8	0.6	
Honey	25	1 T.	**20.3**	**0.1**	**—**	**85**
			81.2	0.4	—	
Alfalfa	25	1 T.	**20.4**	Trace	**—**	**85**
			81.7	0.1	—	
Buckwheat	25	1 T.	**19.5**	Trace	**—**	**80**
			78.1	0.1	—	
Orange	25	1 T.	**19.7**	Trace	**—**	**80**
			78.6	0.1	—	
White clover	25	1 T	**19.4**	Trace	**—**	**80**
			77.5	0.1	—	
Honeydew melon	240	¾ c. diced	**14.2**	**1.4**	**0.2**	**65**
			5.9	0.6	0.1	
Horlick's Malted Milk	8	1 T.	**5.4**	**1.3**	**0.7**	**35**
			*68.0	16.4	8.8	
Horseradish, evaporated, Heinz	3	1 T.	**2.0**	**0.5**	**—**	**10**
			66.8	15.6	0.9	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Horseradish, roots, fresh	10	2 t.	**1.9**	**0.3**	Trace	**9**
			*19.0	3.2	0.2	
Huckleberries	100	⅔ c.	**9.7**	**0.6**	**0.6**	**50**
			*9.7	0.6	0.6	

I

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Ice-cream:						
50% overrun	50	1 "roll"	**10.5**	**2.0**	**6.0**	**110**
			*21.0	4.0	12.0	
High-grade	50	1 "roll"	**9.0**	**1.7**	**11.5**	**150**
			*18.0	3.5	23.0	
Junket	85	1 gill	**18.2**	**2.3**	**15.3**	**225**
			*21.5	2.7	18.0	
Commerical flavors:						
Chocolate	85	1 gill	**21.2**	**4.5**	**9.4**	**195**
			*24.9	5.3	11.0	
Coffee	85	1 gill	**19.1**	**3.8**	**8.1**	**170**
			*22.5	4.5	9.5	
Ice-cream, com.:						
Strawberry	85	1 gill	**18.3**	**3.4**	**7.7**	**160**
			*21.5	4.0	9.0	
Vanilla	85	1 gill	**19.1**	**3.8**	**10.2**	**190**
			*22.5	4.5	12.0	
Ice-cream cones, *Trumpet*, N. B. C.	5	1	**4.2**	**0.4**	**0.1**	**20**
			83.9	8.1	1.7	
Iceland moss (lichen)	10	1 T.	**—**	**0.9**	**—**	**3**
			70.0	8.7	—	
Ices, fruit	60	2 oz.	**16.2**	**0.1**	**0.1**	**65**
			*27.0	0.1	0.1	
Ices, water, com.	120	½ c.	**39.5**	**0.6**	**0**	**165**
			33.0	0.5	0	
Indian nuts, see Pine nuts.						
Irish moss (algæ)	10	1 T.	**—**	**0.7**	**—**	**3**
			*0.4	6.8	—	
Irish stew	115	¼ lb.	**9.0**	**4.4**	**12.6**	**170**
			*7.8	3.8	11.0	
Isinglass, sturgeon	3	1 t.	**—**	**2.7**	Trace	**10**
			—	89.3	1.6	

J

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Jellies, preserves, av.	12	1 t.	**7.7**	**—**	**—**	**30**
			64.0	—	—	
Jell-O	25	¼ box	**21.5**	**2.8**	**0**	**100**
			86.0	11.0	0	
Jelly roll	50	1 sl.	**27.7**	**2.4**	**9.5**	**210**
			*55.4	4.8	19.0	
Jujube, Chinese	100		**24.1**	**1.2**	**0.3**	**110**
			24.1	1.2	0.3	
Jujube, Chinese, dried	100		**59.9**	**4.0**		**260**
			59.9	4.0		
Jujube, Fla.	25	10 av.	**3.1**	**0.2**	**0.1**	**14**
			*12.3	1.0	0.4	
Julienne soup, canned, conc.	120	½ c.	**1.1**	**3.1**	**—**	**15**
			0.9	2.6	—	
Junior Foods see p. 145.						
Junket:						
Ice-cream	85	1 gill	**18.2**	**2.3**	**15.3**	**225**
			*21.5	2.7	18.0	
Powder, caramel	12	1 T. (¼ pkg.)	**11.8**	**—**	**—**	**50**
			98.8	0.1	0.1	

K

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Junket Powder:						
Lemon	11	1 T. (¼ pkg.)	**10.9**	—	—	45
			98.8	0.1	0.1	
Chocolate	14	1 T. (¼ pkg.)	**12.3**	**0.3**	**0.6**	55
			87.7	2.1	4.1	
Orange	11	1 T. (¼ pkg.)	**10.9**	—	—	45
			98.8	0.1	0.1	
Raspberry	11	1 T. (¼ pkg.)	**10.8**	—	—	45
			98.0	0.1	0.1	
Vanilla	11	1 T. (¼ pkg.)	**10.8**	—	—	45
			98.0	0.2	0.1	
Tablet	0.5	1	—	—	—	—
			—	—	—	

K

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Kaki, Japanese persimmon	100	1 lg.	**20.0**	**0.8**	**0.4**	90
			20.0	0.8	0.4	
Kale, leaves	175	1¾ c.	**12.6**	**6.8**	**1.1**	80
			7.2	3.9	0.6	
Kale, cooked	100	½ c.	**4.0**	**1.8**	**0.3**	25
			4.0	1.8	0.3	
Karo, powdered	8	1 T.	**7.6**	**0**	**0**	30
			*95.0	0	0	
Karo syrup, Blue Label	20	1 T.	**14.8**	**0**	**0**	60
			*74.0	0	0	
Karo syrup, Green Label	160	½ c.	**120.0**	**0**	**0**	490
			*75.0	0	0	
Karo syrup, Red Label	160	½ c.	**120.0**	**0**	**0**	490
			*75.0	0	0	
Kephir	100	1 wine glass	**1.6**	**3.1**	**2.0**	40
			1.6	3.1	2.0	
Ketchup, tomato	20	1 T.	**5.0**	**0.5**	**0.2**	25
			25.0	2.5	0.8	
Kidney beans, baked, com.	250	1 c.	**52.5**	**18.8**	**3.8**	330
			21.0	7.5	1.5	
Kidney beans, red, canned	250	1 c.	**43.3**	**17.5**	**0.5**	255
			*17.3	7.0	0.2	
Kidneys, fresh:						
Beef	155	½ c. diced	**1.4**	**23.3**	**12.6**	220
			0.9	15.0	8.1	
Pork	115	¼ lb.	**0.8**	**17.8**	**5.6**	130
			0.7	15.5	4.8	
Sheep	115	¼ lb.	**1.1**	**19.0**	**3.5**	115
			1.0	16.5	3.2	
Veal	115	¼ lb.	**0.2**	**19.3**	**6.0**	135
			0.2	16.8	5.2	
Kidneys, cooked:						
Ox, stewed	115	¼ lb.		**29.6**	**6.7**	185
				25.7	5.8	
Sheep, fried	115	¼ lb.		**32.2**	**10.5**	230
				28.0	9.1	
Kingfish	230	½ lb.		**43.5**	**2.1**	200
				18.9	0.9	
Kippered herring, canned	115	¼ lb.	**0**	**26.2**	**18.8**	290
			0	22.8	16.3	
Kippers, baked	60	2 oz.		**13.9**	**6.8**	120
				23.2	11.4	
Kippers, salted	115	¼ lb.		**23.6**	**9.8**	190
				20.5	8.5	
Kix, General Mills	35	1½ c.	**28.8**	**2.8**	**0.7**	135
			82.3	8.0	1.9	
Kohlrabi (Dutch heads)	100	½ c.	**4.2**	**2.0**	**0.1**	25
			*4.2	2.0	0.1	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Kohlrabi, stems	50	½ c.	**3.4**	**1.1**	**0.1**	20
			6.7	2.1	0.1	
Kohlrabi, cooked	100	½ c.	**2.5**	**1.0**	**—**	14
			*2.5	1.0	—	
Kola nut	100		**45.4**	**4.9**	**1.3**	220
			*45.4	4.9	1.3	
Koumiss	100	1 wine glass	**3.6**	**2.7**	**7.0**	90
			3.6	2.7	7.0	
Krim-Ko, chocolate-flavored drink	250	1 c.	**27.8**	**7.5**	**3.8**	180
			11.1	3.0	1.5	
Kumquats	50	3 med.	**7.5**	**0.3**	**0.1**	35
			15.0	0.7	0.3	

L

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Lactic Acid milk; see milks, powdered.						
Lady-fingers	30	5, 2½″ long	**21.2**	**2.6**	**1.5**	110
			70.6	8.8	5.0	
Lamb, fresh:						
Brains	230	½ lb.		**21.8**	**16.8**	245
				9.5	7.3	
Breast	230	½ lb.		**43.9**	**54.3**	685
				19.1	23.6	
Fore-quarter	230	½ lb.		**42.1**	**59.3**	725
				18.3	25.8	
Hind-quarter	230	½ lb		**45.1**	**43.9**	595
				19.6	19.1	
Leg, hind, medium fat	230	½ lb.		**44.2**	**37.0**	525
				19.2	16.5	
Loin	230	½ lb.		**43.0**	**65.1**	780
				18.7	28.3	
Muscle	230	½ lb.	**1.6**	**34.8**	**62.1**	725
			0.7	15.1	27.0	
Neck	230	½ lb.		**40.7**	**57.0**	695
				17.7	24.8	
Shoulder	230	½ lb.		**41.6**	**68.3**	805
				18.1	29.7	
Side	230	½ lb.		**40.5**	**53.1**	660
				17.6	23.1	
Lamb, cooked:						
‡Chop, broiled	115	¼ lb.		**35.6**	**8.6**	225
				31.0	7.5	
‡Leg, spring, roasted	115	¼ lb.		**35.2**	**6.8**	210
				30.6	5.9	
Roasted, cold	115	¼ lb.		**28.4**	**13.8**	245
				24.7	12.0	
Stew, canned	115	¼ lb.	**8.6**	**7.8**	**5.2**	115
			7.5	6.8	4.5	
Tongue, canned	115	¼ lb.		**14.8**	**22.2**	265
				12.9	19.3	
Lambsquarters (Chenopodium)	75	1⅓ c.	**6.2**	**2.9**	**0.5**	40
			8.3	3.8	0.7	
Lambsquarters, Algerian	70	1¼ c.	**7.4**	**5.3**	**0.6**	60
			10.5	7.6	0.9	
Lard, refined	15	1 T.	**0**	**0**	**15.0**	140
			0	0	100.0	
Lard, unrefined	15	1 T.	**—**	**0.3**	**14.1**	130
			—	2.2	94.0	
Leeks, bulbs and leaves	55	½ c.	**2.4**	**1.4**	**0.2**	15
			*4.4	2.5	0.4	
Leeks, cooked	100	½ c.	**4.0**	**2.0**	**0.2**	25
			*4.0	2.0	0.2	
Lemon	100	1, 2″ diam.	**7.4**	**1.0**	**0.7**	40
			*7.4	1.0	0.7	

L

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Lemonade, plain	240	1 c.	**24.0**	**—**	**—**	100
			10.0	—	—	
Lemon juice	15	1 T.	**1.5**	**—**	**—**	6
			9.8[1]	—	—	
Lemon juice, canned	15	1 T.	**1.2**	**—**	**—**	5
			8.0	0.4	0.3	
Lemon peel, candied	10	1 sm. piece	**8.1**	**—**	**—**	35
			80.6	0.4	0.3	
Lemon extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**	0
			0	0	0	
Lentils, cooked	100	½ c.	**28.0**	**12.0**	**4.5**	205
			28.0	12.0	4.5	
Lentils, dried	60	¼ c.	**32.8**	**15.4**	**0.6**	205
			54.7	25.7	1.0	
Lettuce	50	2 lg. leaves	**0.5**	**0.6**	**0.2**	6
			*1.0	1.2	0.3	
Lettuce, cooked	100	½ c.	**0.5**	**0.5**	**0.1**	5
			0.5	0.5	0.1	
Leyden cheese	20	1 cu. in.	**0.2**	**7.2**	**2.2**	50
			*1.0	35.9	11.0	
Libby, homogenized foods, see page 144.						
Lichi nuts, see Litchi.						
Lichens, see Iceland moss.						
Liederkranz cheese	30	1 oz.		**5.0**	**7.3**	90
				16.8	24.5	
Lima beans, green	75	½ c.	**16.5**	**5.6**	**0.6**	95
			*22.0	7.5	0.8	
Lima beans, yellow, cooked	125	½ c.	**27.5**	**11.2**	**1.0**	170
			22.0	9.0	0.8	
Lima beans, canned	130	½ c.	**19.0**	**5.2**	**0.4**	105
			14.6	4.0	0.3	
Lima beans, dried	75	½ c.	**49.4**	**13.6**	**0.5**	265
			65.9	18.1	1.5	
Lima bean flour	100	1¼ c. sc.	**63.0**	**21.5**	**1.4**	360
			63.0	21.5	1.4	
Limburg cheese, American	40	1 triangle		**11.4**	**12.0**	160
				28.5	29.8	
Limburg cheese, European	40	1 triangle		**8.5**	**7.8**	105
				21.3	19.6	
Limes	40	1, 1½" long	**4.9**	**0.3**	**Trace**	20
			12.3	0.8	0.1	
Limes, Florida	40	1 med.	**0.2**	**0.3**	**Trace**	2
			0.5	0.8	0.1	
Lime juice	15	1 T.	**1.2**	**0.1**	**—**	5
			7.8	0.5	—	
Limequat juice, Florida	15	1 T.	**1.0**			4
			*6.8			
Limu, see Algae, Hawaiian.						
Ling cod	230	½ lb.		**37.0**	**—**	150
				16.1	Trace	
Ling, fried	115	¼ lb.	**7.2**	**19.3**	**14.3**	240
			*6.3	16.8	12.4	
Ling, steamed	115	¼ lb.		**25.8**	**0.9**	115
				22.4	0.8	
Litchi	25	10 (large pits) 8 (small pits)	**17.5**	**0.9**	**0.1**	75
			70.0	3.6	0.5	
Livarot cheese	25	1½" x 1" x ¾"	**2.0**	**7.9**	**5.5**	90
			*8.0	31.8	22.0	

* Largely assimilable.
Blank space indicates lack of data.
[1] Sugar content 2.3 per cent, remainder citric acid.
‡ Gross fat removed.
Negligible quantity is designated by —.

L

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Liver, fresh:						
Beef	230	½ lb.	**5.8**	**46.9**	**12.4**	**310**
			2.5	20.4	5.4	
Chicken	75	2 med.	**1.8**	**16.8**	**3.2**	**105**
			2.4	22.4	4.2	
Goose	100	2 med.	**3.7**	**16.6**	**15.9**	**230**
			3.7	16.6	15.9	
Mutton	230	½ lb.	**11.6**	**53.2**	**20.8**	**460**
			5.0	23.1	9.0	
Pork	230	½ lb.	**3.2**	**49.2**	**10.4**	**310**
			1.4	21.4	4.5	
Turkey	100		**0.7**	**22.0**	**4.8**	**140**
			0.7	22.0	4.8	
Liver, cooked:						
Calves', fried	115	¼ lb.	**2.8**	**33.3**	**16.7**	**305**
			2.4	29.0	14.5	
Ox, fried	115	¼ lb.	**4.6**	**33.9**	**18.3**	**330**
			4.0	29.5	19.5	
Liver paste (paté de foie gras)	6	1 t.	**0.3**	**0.7**	**2.6**	**30**
			4.8	11.4	43.8	
Liver sausage or pudding	60	2 oz.	**0.9**	**10.0**	**12.4**	**195**
			1.5	16.7	20.6	
Lobster, cooked	100	1 av.	**0.4**	**17.2**	**1.9**	**90**
			0.4	17.2	1.9	
Lobster, flaked	100	⅔ c.	**0.4**	**16.4**	**1.8**	**85**
			0.4	16.4	1.8	
Lobster, canned	90	½ c.	**0.4**	**16.3**	**1.0**	**80**
			0.5	18.1	1.1	
Lobster paste	6	1 t.	**0.2**	**0.9**	**0.6**	**10**
			*3.0	15.5	9.8	
Loganberries	75	⅔ c.	**2.5**	**0.8**	**—**	**15**
			*3.4	1.1	—	
Loganberries, canned	120	⅔ c.	**33.6**	**0.8**	**0**	**140**
			28.0	0.7	0	
Loganberry juice	120	½ c.	**12.1**	**0.7**	**—**	**65**
			10.1	0.6	—	
***Log Cabin* syrup**	18	1 T.	**11.9**	**0**	**0**	**50**
			*66.0	0	0	
Loquat	25	1 med.	**2.5**	**0.1**	Trace	**10**
			*10.1	0.4	0.2	
Loquat, Japanese	15	1 lg.	**1.6**	**0.1**	**—**	**7**
			*10.9	0.4	0.1	
Lungs, fresh:						
Beef	115	¼ lb.		**17.8**	**3.5**	**105**
				15.5	3.0	
Calf	115	¼ lb.		**19.7**	**5.8**	**135**
				17.1	5.0	
Sheep	115	¼ lb.		**23.2**	**3.2**	**125**
				20.2	2.8	
Lychee, see Litchi						

M

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Macadamia nuts, Hawaiian, fried in oil and salted	30	14	2.4	2.6	23.5	240
			8.2	8.6	78.5	
Macaroni	75	½ c.	55.6	10.1	0.7	275
			74.1	13.1	0.9	
Macaroni, Quaker	75	½ c.	55.1	10.5	0.7	275
			73.5	14.0	0.9	

M

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Macaroni, boiled	240	1 c.	**37.9**	**7.2**	**3.6**	220
			15.8	3.0	1.5	
Macaroni and cheese	115	¼ lb.	**17.2**	**8.7**	**14.7**	245
			*15.0	7.6	12.8	
Macaroni in cream sauce, Heinz	240	1 c.	**33.4**	**10.8**	**3.1**	210
			13.9	4.5	1.3	
Macaroons	25	2, 1⅜″ diam.	**16.3**	**1.6**	**3.8**	110
			65.2	6.5	15.2	
Macedoine (mixed vegetables), canned	80	½ c.	**3.1**	**1.1**	—	15
			*3.9	1.4	—	
Mackerel:						
Raw	230	½ lb.		**43.0**	**16.3**	330
				18.7	7.1	
Cooked	115	¼ lb.	**4.2**	**19.2**	**7.3**	165
			3.7	16.7	6.4	
Fried	115	¼ lb.		**23.0**	**13.0**	215
				20.0	11.3	
Canned	100	½ c.		**22.6**	**7.9**	165
				22.6	7.9	
Salt	115	¼ lb.		**24.3**	**26.0**	340
				21.1	22.6	
Smoked	115	¼ lb.		**27.4**	**15.0**	250
				23.8	13.0	
Malt Breakfast Food	30	¼ c.	**22.7**	**3.2**	**0.3**	110
			75.8	10.7	1.0	
Malted milk, Borden	8	1 T.	**5.6**	**1.2**	**0.8**	35
			70.1	15.1	9.2	
Malted milk, Horlick	8	1 T.	**5.4**	**1.3**	**0.7**	35
			*68.0	16.4	8.8	
Malted milk, Thompson, chocolate	10	1 T.	**8.2**	**0.8**	**0.6**	40
			82.3	7.8	5.8	
Maltex Cereal	30	¼ c.	**23.0**	**5.0**	**0.5**	115
			76.7	16.7	1.7	
Mandarinen (tangerines)	100	2, 2″ diam.	**10.9**	**0.8**	**0.3**	50
			10.9	0.8	0.3	
Mango, Florida	160	1 av.	**19.2**	**0.3**	**0.3**	85
			*12.0	0.5	0.5	
Manioca starch (tapioca)	40	¼ c.	**35.2**	**0.2**	Trace	145
			88.0	0.4	0.1	
Maple extract, imitation, Burnett, A.P.	6	1 t.	**1.8**	**0**	**0**	7
			30.0	0	0	
Maple sugar	60	1, 1½″ sq.	**49.7**	—	—	205
			*82.8	—	—	
Maple syrup	18	1 T.	**12.8**	—	—	50
			*71.4	—	—	
Margarine	15	1 T.	—	**0.1**	**12.2**	115
			0.4	0.6	81.0	
Marmalade, orange	25	1 T.	**21.1**	**0.2**	Trace	85
			84.5	0.6	0.1	
Marmite, see *Vegex*.						
Marrow, beef	20	1 T.		**0.4**	**18.6**	175
				2.2	92.8	
Marrow, vegetable	100	1 c.	**1.4**	**0.5**	**0.1**	10
			*1.4	0.5	0.1	
Marshmallows	30	5, 1¼″ diam.	**24.0**	**2.0**	—	105
			80.0	6.7	—	
Marzipan (almond paste)	10	1 t.	**1.1**	**1.3**	**3.5**	50
			10.9	13.2	34.5	

* Largely assimilable.
Blank space indicates lack of data.
[1] The term "skimmed" is not acceptable.

‡ Gross fat removed.
Negligible quantity is designated by —

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Matzoth	20	1, 6″ diam.	**14.0**	**3.0**	**—**	70
			70.0	15.0	—	
Mayonnaise, com.	20	1 T.	**0.4**	**0.3**	**16.0**	150
			2.0	1.4	80.0	
Maypl cereal	30	¼ c.	**20.4**	**4.7**	**1.3**	115
			67.9	15.6	4.4	
Mazola	15	1 T.	**0**	**0**	**14.7**	135
			0	0	98.1	
Meal, barley	130	1 c.	**82.2**	**13.7**	**2.9**	420
			66.3	10.5	2.2	
Corn, granular	130	1 c.	**98.0**	**12.0**	**2.5**	475
			75.4	9.2	1.9	
Pea	100	¾ c.	**28.0**	**35.9**	**17.5**	390
			28.0	35.9	17.5	
Rye	130	1 c.	**93.0**	**17.7**	**2.6**	465
			71.5	13.6	2.0	
Soy bean	100	1¼ c.	**—**	**36.5**	**17.5**	310
			—	36.5	17.5	
Meal for Millions, see *Multi-purpose Food.*						
Meat for babies, see pages 141–143						
Meat paste (chicken, ham, tongue)	20	1 T.	**0.8**	**3.9**	**2.5**	45
			*4.2	19.7	12.7	
Meats, General Classification						
Lean, very well done	115	¼ lb.		**39.1**	**6.9**	225
				34.0	6.0	
Medium done	115	¼ lb.		**34.5**	**6.9**	205
				30.0	6.0	
Rare	115	¼ lb.		**31.0**	**6.9**	190
				27.0	6.0	
Medium fat, well done	115	¼ lb.		**34.5**	**20.7**	335
				30.0	18.0	
Medium done	115	¼ lb.		**31.0**	**20.7**	320
				27.0	18.0	
Rare	115	¼ lb.		**26.4**	**20.7**	300
				23.0	18.0	
Fat, medium done	115	¼ lb.		**25.3**	**34.5**	425
				22.0	30.0	
Very fat, medium done	115	¼ lb.		**19.5**	**51.7**	560
				17.0	45.0	
Melba toast, white bread	20	2 sl., 4″ sq.	**15.8**	**2.8**	**0.4**	80
			79.0	14.0	1.8	
Melon pawpaw, see Papaya.						
Melons, see specific item.						
Milks and Cream, cow:						
Whole	240	1 c.	**12.0**	**7.9**	**9.6**	170
			*5.0	3.3	4.0	
Whole	30	1 oz.	**1.5**	**1.0**	**1.2**	20
			*5.0	3.3	4.0	
Top (6 oz.)	170	6 oz.	**7.6**	**5.3**	**11.9**	165
			*4.5	3.1	7.0	
Top	28	1 oz.	**1.3**	**0.8**	**2.0**	35
			*4.5	3.1	7.0	
Skim,[1] hand	240	1 c.	**11.3**	**8.6**	**1.7**	95
			*4.7	3.6	0.7	
Skim,[1] hand	30	1 oz.	**1.4**	**1.1**	**0.2**	12
			*4.7	3.6	0.7	
Skim,[1] separator	240	1 c.	**12.0**	**8.9**	**0.5**	12
			*5.0	3.7	0.2	
Skim,[1] separator	30	1 oz.	**1.5**	**1.1**	**0.1**	90
			*5.0	3.7	0.2	

M

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Milks and Cream, cow:						
Whey	225	1 c.	11.4	2.3	0.7	65
			*5.0	1.0	0.3	
Cream, light (20% fat)	230	1 c.	9.2	6.9	46.0	495
			*4.0	3.0	20.0	
Cream, light (20% fat)	27	1 oz.	1.1	0.8	5.0	55
			*4.0	3.0	20.0	
Cream, light (20% fat), sour	15	1 T.	0.4	0.5	3.0	30
			*3.0	3.1	20.0	
Cream, medium (30% fat)	225	1 c.	7.9	5.9	67.0	680
			*3.5	2.6	30.0	
Cream, medium (30% fat)	25	1 oz.	0.9	0.6	7.5	75
			*3.5	2.6	30.0	
Cream, whipping (32% fat)	225	1 c.	7.4	5.6	72.0	725
			*3.3	2.5	32.0	
Cream, heavy (40% fat)	25	1 oz.	0.9	0.5	10.0	100
			*3.0	2.2	40.0	
Cream, heavy (40% fat), sour	14	1 T.	0.4	0.3	5.6	55
			*2.7	2.3	40.0	
Cream (32% fat), whipped	10	1 T.	0.3	0.3	3.2	30
			*3.3	2.5	32.0	
Condensed	25	1 T.	13.5	2.2	2.1	85
			*54.1	8.8	8.3	
Condensed, Eagle Brand, Borden	25	1 T.	13.4	2.0	2.2	80
			*53.5	8.1	9.0	
Condensed, Lion	25	1 T.	14.0	1.9	2.0	85
			*56.0	7.6	8.1	
Evaporated	15	1 T.	1.5	1.0	1.2	20
			*10.1	6.7	8 2	
Evaporated, Borden	15	1 T.	1.4	1.0	1.2	20
			*9.7	6.9	7.9	
Evaporated, Carnation	15	1 T.	1.5	1.0	1.2	20
			*9.9	6.8	7.9	
Evaporated, Lion	15	1 T.	1.5	1.0	1.2	20
			*9.9	6.8	7.9	
Evaporated, Pet	15	1 T.	1.5	1.1	1.2	20
			*9.0	7.1	7.9	
Evaporated, Van Camp	15	1 T.	1.5	1.0	1.2	20
			*10.2	7.7	7.8	
Reconstituted	240	1 c.	12.7	7.5	8.6	165
			*5.3	3.1	3.6	
Milks, cultured:						
Acidophilus, Lederle	240	1 c.	7.2	8.4	8.4	145
			*3.0	3.5	3.5	
Acidophilus, Walker-Gordon	240	1 c.	9.1	8.2	4.8	115
			*3.8	3.4	2.0	
Buttermilk, skim, com.	240	1 c.	10.8	7.9	1.0	85
			*4.5	3.3	0.4	
Buttermilk, whole, com.	240	1 c.	10.8	7.9	9.1	160
			*4.5	3.3	3.8	
Buttermilk, sour cream	240	1 c.	9.4	8.0	1.2	85
			*3.9	3.3	0.5	
Buttermilk, sweet cream	240	1 c.	10.6	8.4	1.0	85
			*4.4	3.5	0.4	
Kephir	100	1 wine glass	1.6	3.1	2.0	40
			1.6	3.1	2.0	
Koumiss	100	1 wine glass	3.6	2.7	7.0	90
			*3.6	2.7	7.0	
Yoghurt	100	1 wine glass	9.4	7.4	7.2	135
			*9.4	7.4	7.2	

* Largely assimilable.
Blank space indicates lack of data.
‡ Gross fat removed.
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[1] The term "skimmed" is not acceptable.

M

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Milks, powdered:						
Whole, dried	15	2 T.	**5.5**	**4.3**	**4.0**	**75**
			*36.5	28.7	26.9	
Skim, dried	15	2 T.	**5.8**	**5.3**	**0.3**	**50**
			*38.8	35.4	1.7	
Whey, dried	8	1 T.	**6.0**	**1.0**	**—**	**30**
			*74.5	13.0	0.5	
Dryco, skim[1]	7	2 T.	**3.2**	**2.2**	**0.8**	**30**
			*46.0	32.0	12.0	
Klim, whole	8	1 T.	**3.0**	**2.1**	**2.2**	**40**
			*38.0	26.7	28.0	
Malted, Borden	8	1 T.	**5.6**	**1.2**	**0.8**	**35**
			70.1	15.1	9.2	
Malted, Horlick	8	1 T.	**5.4**	**1.3**	**0.7**	**35**
			*68.0	16.4	8.8	
Malted, chocolate, Thompson	10	1 T.	**8.2**	**0.8**	**0.6**	**40**
			82.3	7.8	5.8	
Protein, Merrell-Soule	8	1 T.	**1.8**	**3.0**	**2.2**	**40**
			*23.0	37.0	27.0	
Skim, Merrell-Soule	8	1 T.	**4.0**	**3.0**	**0.1**	**30**
			*49.9	37.7	1.4	
Skim, lactic acid, Merrell-Soule	8	1 T.	**3.8**	**2.9**	**0.1**	**30**
			*47.8	36.0	1.0	
Whole, lactic acid, Merrell-Soule	8	1 T.	**2.6**	**2.1**	**2.2**	**40**
			*32.5	26.5	28.0	
Milks, various species:						
Ass	245	1 c.	**14.9**	**4.9**	**3.7**	**115**
			*6.1	2.0	1.5	
Buffalo	245	1 c.	**11.7**	**11.7**	**18.1**	**265**
			*4.8	4.8	7.4	
Camel	235	1 c.	**13.1**	**9.1**	**6.6**	**150**
			*5.6	3.9	2.8	
Carabao	240	1 c.	**10.3**	**13.0**	**24.0**	**240**
			*4.3	5.4	10.0	
Ewe's (sheep)	245	1 c.	**13.9**	**14.2**	**15.9**	**255**
			*4.8	5.8	6.5	
Goat	240	1 c.	**9.1**	**9.6**	**10.1**	**170**
			*3.8	4.0	4.2	
Goat, evaporated, Meyenberg	15	1 T.	**1.3**	**1.0**	**1.0**	**20**
			*8.8	7.0	7.1	
Human	30	1 oz.	**1.9**	**0.4**	**0.9**	**20**
			*6.5	1.5	3.3	
Llama	245	1 c.	**13.7**	**9.5**	**7.8**	**170**
			*5.6	3.9	3.2	
Mare's	245	1 c.	**14.2**	**4.9**	**2.9**	**105**
			*5.8	2.0	1.2	
Reindeer	250	1 c.	**5.2**	**25.0**	**42.7**	**300**
			*2.1	10.0	17.1	
Millet	100		**70.5**	**8.2**	**4.2**	**360**
			*70.5	8.2	4.2	
Mince meat, homemade	115	¼ lb.	**36.9**	**5.5**	**7.7**	**245**
			32.1	4.8	6.7	
Mince meat, com.	115	¼ lb.	**69.2**	**7.7**	**1.6**	**330**
			60.2	6.7	1.4	
Mince meat, Heinz	115	¼ lb.	**51.9**	**3.2**	**3.3**	**255**
			45.1	2.8	2.9	
Mince pie	100	1 sl.	**42.6**	**4.7**	**19.7**	**375**
			*42.6	4.7	19.7	
Mineral oil	14	1 T.	**0**	**0**	**0**	**0**
			0	0	0	
Mint extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**	**0**
			0	0	0	

M

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Minute Tapioca	40	¼ c.	**35.2**	**0.2**	Trace	**145**
			88.0	0.4	0.1	
Miracle Whip, Kraft	20	1 T.	**1.7**	**0.2**	**10.2**	**105**
			8.5	1.2	50.9	
Mock turtle soup, canned, conc.	130	½ c.	**7.8**	**7.5**	**1.0**	**75**
			6.0	5.8	0.8	
Mock turtle soup, canned	240	1 c.	**12.9**	**3.8**	**1.2**	**80**
			5.4	1.6	0.5	
Molasses, Br'er Rabbit, Gold Label	190	½ c.	**140.0**	**0.9**	**0**	**575**
			73.7	0.5	0	
Molasses, Br'er Rabbit, Green Label	190	½ c.	**133.2**	**1.7**	**0**	**555**
			70.1	0.9	0	
Molasses, Cane:						
Light	25	1 T.	**16.5**	**—**	**—**	**65**
			*65.0	—	—	
Medium	25	1 T.	**15.0**	**—**	**—**	**60**
			*60.0	—	—	
Dark	25	1 T.	**13.8**	**—**	**—**	**55**
			*55.0	—	—	
Molasses cookies	10	1	**7.7**	**0.6**	**0.9**	**40**
			76.7	6.4	8.9	
Mountain spinach (Orach)	75	1½ c.	**3.5**	**3.3**	**0.3**	**30**
			4.7	4.5	0.4	
Mozzarella, Italian cheese	30	1 oz.	**0.5**	**8.4**	**7.3**	**105**
			*1.8	28.1	24.3	
Muffets, Quaker	23	1	**17.5**	**2.6**	**0.3**	**85**
			75.6	11.1	1.4	
Mulberries, black	75	⅔ c.	**6.1**	**1.0**	**—**	**30**
			*8.1	1.3	—	
Mulberries, black, white, and red	75	¾ c.	**11.0**	**0.9**	**0.5**	**50**
			14.6	1.2	0.6	
Mullet, grey	50	2 av.	**0.4**	**7.9**	**3.4**	**65**
			0.8	15.8	6.8	
Mullet, grey, steamed	50	2 av.		**10.8**	**2.0**	**65**
				21.6	4.0	
Mullet, red	100	2 av.	**1.3**	**15.7**	**4.7**	**115**
			1.3	15.7	4.7	
Mullet, red, steamed	100	2 av.		**21.4**	**4.3**	**130**
				21.4	4.3	
Mulligatawny soup, canned, conc.	150	½ c.	**16.1**	**4.1**	**0.8**	**90**
			10.7	2.7	0.5	
Multi-purpose Food	30	1 oz.	**10.5**	**12.7**	**1.4**	**105**
			35.0	42.3	4.5	
Mung beans, solid green seed	100		**59.9**	**23.3**	**1.0**	**350**
			59.9	23.3	1.0	
Mung beans, sprouts	125	1 c.	**5.0**	**3.6**	**0.4**	**35**
			4.0	2.9	0.3	
Münster cheese	30	1⅛″ cube	**2.1**	**5.1**	**7.7**	**100**
			*6.9	16.9	25.9	
Münster cheese, American	30	1⅛″ cube		**6.7**	**9.3**	**115**
				22.2	31.0	
Mushrooms:						
Fresh	50	½ c. diced	**—**	**—**	**0.2**	**2**
			6.8	3.5	0.4	
Boiled	100	½ c.	**—**	**—**	**0.2**	**2**
			—	—	0.2	
Fried	60	½ c.	**—**	**—**	**13.4**	**130**
			*0.0	2.2	22.3	
Canned, whole	80	½ c.	**—**	**—**	**0.2**	**2**
			6.2	1.9	0.3	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Mushrooms:						
Canned, fancy buttons	80	½ c.	—	—	0.2	2
			3.2	4.5	0.2	
Canned, sliced	80	½ c.	—	—	0.2	2
			3.7	4.4	0.2	
Canned, sliced stems and pieces	80	½ c.	—	—	0.2	2
			3.0	3.1	0.2	
Dried	100		—	—	1.5	14
			64.0	15.5	1.5	
Mushroom broth, canned	120	½ c.	—	—	0.2	2
			1.2	1.1	0.2	
Mushroom soup, cream of, canned	240	1 c.	9.6	5.8	10.6	160
			4.0	2.4	4.4	
Muskellunge	230	½ lb.		46.5	5.6	245
				20.2	2.5	
Muskmelon, California	200	½, 5″ diam.	14.4	1.2	0.2	65
			*7.2	0.6	0.1	
Muskmelon juice	120	½ c.	10.9		—	45
			*9.1		—	
Mussels	230	½ lb.	9.4	20.0	2.5	145
			4.1	8.7	1.1	
Mussels, boiled	60	2 oz.	—	10.1	1.2	55
			Trace	16.8	2.0	
Mussels, canned	100	½ c.	1.5	18.2	3.3	110
			*1.5	18.2	3.3	
Mustard, dry	5	1 t.	—	0.1	—	—
			0.3	2.4	0.3	
Mustard, prepared, com.	10	1 heaping t.	0.3	0.4	0.7	10
			2.8	4.3	6.5	
Mustard greens	50	½ c.	2.0	1.2	0.2	15
			4.0	2.3	0.3	
Mustard and cress	20	½ c.	0.2	0.3	—	2
			*0.9	1.6	—	
Mutton, fresh:						
Chuck, all analyses	230	½ lb.		33.6	84.6	925
				14.6	36.8	
Chuck, lean	230	½ lb.		40.9	37.5	515
				17.8	16.3	
Flank, medium fat	230	½ lb.		35.0	88.1	965
				15.2	38.3	
Fore-quarter	230	½ lb		35.9	71.0	810
				15.6	30.9	
Heart	115	¼ lb		19.4	14.5	210
				16.9	12.6	
Hind-quarter	230	½ lb.		38.4	64.6	780
				16.7	28.1	
Kidney	115	¼ lb.		19.0	3.5	110
				16.5	3.2	
Leg, hind, lean	230	½ lb.		45.5	28.5	450
				19.8	12.4	
Leg, hind, medium fat	230	½ lb.		42.6	41.4	560
				18.5	18.0	
Liver	230	½ lb.	11.6	53.2	20.8	460
			5.0	23.1	9.0	
Loin, free fat removed	230	½ lb		54.5	42.6	630
				23.7	18.5	
Loin, medium fat	230	½ lb.		36.8	76.1	860
				16.0	33.1	
Lungs	115	¼ lb.		23.2	3.2	125
				20.2	2.8	
Neck, medium fat	230	½ lb.		38.9	46.6	595
				16.9	24.6	
Shoulder, lean	230	½ lb.		44.9	29.7	460
				19.5	12.9	

M

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Mutton, fresh:						
Shoulder, medium fat . .	230	½ lb		**40.7**	**45.8**	**595**
				17.7	19.9	
Side	230	½ lb.		**37.3**	**68.3**	**690**
				16.2	29.8	
Mutton, cooked:						
‡Boiled, lean	75	1 sl.		**23.2**	**3.4**	**125**
				30.8	4.4	
Brains, boiled	115	¼ lb.		**13.5**	**7.7**	**125**
				11.7	6.7	
‡Chop, lean, broiled . .	100	1 chop		**22.6**	**4.5**	**135**
				22.6	4.5	
Chop, fried, lean . . .	100	1 chop	**5.7**	**22.8**	**25.2**	**350**
			*5.7	22.8	25.2	
Chop, fried, med. fat . .	100	1 chop	**2.6**	**15.4**	**60.1**	**635**
			*2.6	15.4	60.1	
Chop, grilled, lean . . .	100	1 chop		**26.5**	**17.5**	**270**
				26.5	17.5	
Chop, grilled, med. fat . .	100	1 chop		**19.9**	**45.0**	**500**
				19.9	45.0	
Corned, canned	115	¼ lb.		**33.1**	**26.2**	**380**
				28.8	22.8	
Heart, roasted	115	¼ lb.		**28.7**	**16.9**	**275**
				25.0	14.7	
Kidney, fried	115	¼ lb.		**32.2**	**10.5**	**230**
				28.0	9.1	
Leg, boiled	75	1 sl.		**19.3**	**12.4**	**195**
				25.8	16.6	
‡Leg, roasted	75	1 sl.		**18.7**	**16.9**	**235**
				25.0	22.5	
‡Roasted, cold	115	¼ lb.		**33.4**	**30.8**	**425**
				29.0	26.8	
Scrag and neck, stewed .	115	¼ lb.		**27.8**	**28.0**	**375**
				24.2	24.4	
Tongue, canned	115	¼ lb.		**28.1**	**27.6**	**370**
				24.4	24.0	
Mutton soup, canned, conc. .	140	½ c.	**6.9**	**6.4**	**0.8**	**60**
			4.9	4.6	0.6	
Mysost cheese, American . .	30	1 oz.		**2.9**	**0.8**	**20**
				9.9	2.8	
Mysost cheese (Primost) . .	30	1 oz.		**4.2**	**10.3**	**115**
				14.0	34.5	

N

Navy beans. See Beans, baked.

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Nectarines	125	1, 2″ diam.	**15.5**	**1.1**	—	**70**
			*12.4	0.9	—	
Nettle, leafy shoots . . .	100		**7.1**	**5.5**	**0.7**	**60**
			*7.1	5.5	0.7	
Neufchâtel cheese	30	2 T.	**0.5**	**5.6**	**8.2**	**100**
			*1.5	18.7	27.4	
Neufchâtel cheese, American .	30	2 T.	**0.8**	**6.4**	**5.4**	**80**
			*2.9	21.3	18.2	
Noekkelost cheese, Scandinavian	30	1 oz.	**2.1**	**9.2**	**4.9**	**90**
			*7.0	30.6	16.3	
Noodles, raw	60	½ c.	**45.4**	**7.0**	**0.6**	**220**
			75.6	11.7	1.0	
Noodles, egg, Quaker . . .	60	½ c.	**43.3**	**7.1**	**2.2**	**225**
			72.2	11.9	3.6	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

N

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Cal.
Nut margarine	15	1 T.	—	0.2	12.7	120
			—	1.4	84.8	
Nuts:						
Almonds	30	20	1.3	6.1	16.0	175
			*4.3	20.5	53.5	
Beechnuts	20	⅓ c.	2.6	4.4	11.5	135
			13.2	21.9	57.4	
Brazil	30	4	1.2	4.1	18.4	195
			*4.1	13.8	61.5	
Butternuts	20	12	0.7	5.6	12.2	140
			3.5	27.9	61.2	
Cashew nut kernels, fried in cocoanut oil	15	8	2.0	4.3	7.9	100
			13.4	28.7	52.4	
Chestnuts, fresh	50	8	18.3	1.2	1.3	90
			*36.6	2.3	2.7	
Chestnuts, dried	35	8	26.0	3.7	2.5	185
			74.2	10.7	7.0	
Chestnuts, roasted	50	20	17.7	2.6	2.3	240
			35.4	5.2	4.5	
Cocoanut, fresh	50	2½″ sq.	14.0	2.9	25.0	300
			27.9	5.7	50.6	
Cocoanut, canned moist	90	1 c.	27.0	4.0	37.3	485
			*30.0	4.4	41.4	
Cocoanut, desiccated	45	⅔ c.	17.1	1.9	18.5	250
			*38.1	4.3	41.0	
Filberts (hazelnuts), raw, unsalted	35	20	3.3	5.2	23.0	250
			*9.3	14.9	65.6	
Filberts (hazelnuts), roasted, salted	35	20	4.4	4.9	23.3	255
			*12.6	14.1	66.6	
Hickory	35	¼ c.	4.0	5.4	23.6	260
			11.4	15.4	67.4	
Kola	100		45.4	4.9	1.3	220
			*45.4	4.9	1.3	
Litchi. See Fruits, dried.						
Macadamia, Hawaiian, fried in oil and salted	30	14	2.4	2.6	23.5	240
			8.2	8.6	78.5	
Peanuts	60	⅓ c. or 30	5.1	16.9	29.4	360
			*8.6	28.1	49.0	
Peanut butter	15	1 T.	2.6	4.4	7.0	95
			17.1	29.3	46.5	
Peanut butter com.	15	1 T.	1.7	3.8	7.5	90
			11.0	25.0	50.0	
Pecans	25	6 (whole)	1.0	2.4	18.2	185
			*3.9	9.4	73.0	
Pignolias	10	1 T.	0.7	3.4	4.9	60
			*6.9	33.9	49.4	
Pine (pignolias)	10	1 T.	0.7	3.4	4.9	60
			*6.9	33.9	49.4	
Pine (piniones)	10	1 T.	2.6	0.6	6.1	70
			*26.2	6.5	60.7	
Pine (sabine)	10	1 T.	0.8	2.8	5.4	65
			*8.4	28.1	53.7	
Piñon	10	1 T.	1.7	1.5	6.2	70
			*17.3	14.6	61.9	
Pistachios	20	¼ c.	3.3	4.5	10.8	130
			16.3	22.3	54.0	
Walnuts, California or English	35	6 (whole)	1.8	4.4	18.0	195
			*5.0	12.5	51.5	

O

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Nuts:						
Walnuts, black	35	6 (whole)	**4.1**	**9.7**	**19.7**	**240**
			11.7	27.6	56.3	
Walnuts, soft-shelled	35	6 (whole)	**4.7**	**5.8**	**22.2**	**250**
			13.5	16.6	63.4	
O						
Oatmeal	20	¼ c.	**13.5**	**3.2**	**1.4**	**80**
			67.5	16.1	7.2	
Oats:						
Crushed, Grandmother's	30	¼ c.	**19.6**	**4.5**	**2.0**	**120**
			65.4	14.9	6.5	
Mother's, Quaker, Quick Quaker and Quick Mother's	30	¼ c.	**19.2**	**5.3**	**1.8**	**120**
			64.0	17.8	6.1	
Rolled	30	¼ c.	**19.9**	**5.0**	**2.2**	**120**
			66.3	16.7	7.3	
Rolled, cooked,	100	½ c. sc.	**15.5**	**4.0**	**1.0**	**90**
			15.5	4.0	1.0	
Rolled, Purity	30	¼ c.	**18.5**	**5.0**	**2.0**	**115**
			61.6	16.3	6.1	
Oca, tubers	100		**14.7**	**1.4**	**0.2**	**70**
			*14.7	1.4	0.2	
Oils and Fats:						
Butter	10	1″ x 1″ x ½″	**—**	**0.1**	**8.5**	**80**
			—	1.0	85.0	
Cod-liver	14	1 T.	**0**	**0**	**14.0**	**130**
			0	0	100.0	
Corn	14	1 T.	**0**	**0**	**14.0**	**130**
					100.0	
Cottolene	11	1 T.	**0**	**0**	**11.0**	**100**
					100.0	
Cotton-seed	11	1 T.	**0**	**0**	**11.0**	**100**
					100.0	
Crisco	12	1 T.	**—**	**—**	**12.0**	**110**
			—	—	100.0	
Lard, refined	15	1 T.	**0**	**0**	**15.0**	**140**
			0	0	100.0	
Lard, unrefined	15	1 T.	**—**	**0.3**	**14.1**	**130**
			—	2.2	94.0	
Margarine	15	1 T.	**—**	**0.1**	**12.2**	**115**
			0.4	0.6	81.0	
Mazola	15	1 T.	**0**	**0**	**14.7**	**135**
			0	0	98.1	
Mineral	14	1 T.	**0**	**0**	**0**	**0**
			0	0	0	
Oleomargarine	15	1 T.	**—**	**0.1**	**12.3**	**115**
			0.5	0.9	82.0	
Olive	14	1 T.	**0**	**0**	**14.0**	**130**
			0	0	100.0	
Peanut	14	1 T.	**—**	**—**	**14.0**	**130**
			—	—	100.0	
Pork fat, salt	15	½ oz.		**0.3**	**12.9**	**120**
				1.9	86.2	
Suet, beef	10	1 T.		**0.5**	**8.2**	**80**
				4.7	81.8	
Wesson oil	10	1 T.		**—**	**10.0**	**95**
				Trace	99.7	
Okra	50	7, 2½″ pod	**2.0**	**0.8**	**0.1**	**12**
			*4.0	1.6	0.2	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Okra, cooked	100	½ c. (5 pods)	**3.0**	**1.0**	**0.1**	**15**
			3.0	1.0	0.1	
Okra, canned	65	⅓ c.	**1.9**	**0.5**	Trace	**10**
			*2.9	0.7	0.1	
Oleomargarine	15	1 T.	—	**0.1**	**12.3**	**115**
			0.5	0.9	82.0	
Olive butter	15	1 T.	**2.8**	**0.2**	**3.4**	**45**
			18.6	1.5	22.6	
Olive oil	14	1 T.	**0**	**0**	**14.0**	**130**
			0	0	100.0	
Olives:						
Brined	15	5	—	**0.1**	**1.6**	**15**
			*0.0	0.9	11.0	
Manzanilla, green, bottled	15	5	**1.5**	**0.2**	**3.0**	**35**
			10.0	1.0	20.0	
Queen, green, bottled	15	3	**1.5**	**0.2**	**2.1**	**25**
			10.0	1.0	13.5	
Ripe	20	5, 1″ long	**0.8**	**0.3**	**5.0**	**50**
			4.3	1.7	25.0	
Ripe, canned or bottled	14	3	**0.6**	**0.2**	**2.4**	**25**
			4.0	1.5	17.0	
Omelette	100		—	**7.6**	**30.3**	**315**
			—	7.6	30.3	
Omelette, cheese	100		—	**17.8**	**30.9**	**360**
			Trace	17.8	30.9	
Omelette, jelly	100		**55.4**	**4.8**	**19.0**	**425**
			*55.4	4.8	19.0	
Onion extract, imitation Burnett, A.P.	5	1 t.	**0**	**0**	**0**	**0**
			0	0	0	
Onion pickle, sour, com.	10	2	**0.1**	—	—	**0**
			1.0	0.2	Trace	
Onion pickle, sweet, com.	10	2 c.	**3.7**	—	—	**15**
			37.0	0.1	Trace	
Onion soup, com.	250	1 c.	**7.5**	**4.7**	**6.0**	**105**
			3.0	1.9	2.4	
Onion soup, cream of, com.	240	1 c.	**11.3**	**4.1**	**5.0**	**110**
			4.7	1.7	2.1	
Onions:						
Brown, seasoning	35	1 onion	**2.9**			**12**
			*8.3			
Boiled	75	5 sm.	**2.0**	**0.4**	—	**10**
			*2.7	0.6	—	
Fried	60	½ c.	**6.1**	**1.1**	**20.0**	**215**
			*10.1	1.8	33.3	
Green	25	5 sm.	**2.1**	**0.2**	Trace	**10**
			*8.5	1.0	0.1	
Red skin, large	200	1 onion	**14.4**			**60**
			*7.2			
Spanish (large, yellow jacket)[1]	300	1 onion	**11.6**			**50**
			*3.9			
Spanish[2]	565	1 onion[3]	**8.1**			**35**
			*8.5			
Welsh	100		**6.3**	**2.2**	**0.6**	**40**
			*6.3	2.2	0.6	
White, med.	50	1, 2″ diam.	**4.0**	**0.8**	**0.2**	**20**
			*8.0	1.6	0.3	
White, sm.	15	1 onion	**1.0**			**4**
			*7.0			
White, boiled	15.2	1 onion	**1.0**			**4**
			*6.9			

[1] Prior to season.
[2] In season.
[3] Serving: 2 slices, 95 grams.

O

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Opihi, Australian limpet	115	¼ lb.		3.2	1.4	25
				2.8	1.2	
Opossum	115	¼ lb.		14.9	46.0	490
				13.0	40.0	
Orach (mountain spinach)	75	1½ c.	2.8	3.3	0.3	30
			*3.7	4.5	0.4	
Orach, Peruvian, see Quinoa.						
Oranges	100	1 sm.	8.5	0.8	0.2	40
			*8.5	0.8	0.2	
Canned	135	¾ c.	19.9	1.1	0.3	90
			15.5	0.8	0.2	
Mandarin type (loose-skinned)	100	2, 2″ diam.	10.9	0.8	0.3	50
			10.9	0.8	0.3	
Satsuma	100	2, 2″ diam.	8.7	0.8	0.3	40
			*8.7	0.8	0.3	
Seville	100	1 sm.	11.4	0.8	0.2	55
			11.4	0.8	0.2	
Orange:						
Extract, Burnett, A.P.	5	1 t.	0	0	0	0
			0	0	0	
Juice, California	120	½ c.	15.7	0.7	—	65
			13.1	0.6	—	
Juice, Florida	120	½ c.	11.3	0.7	—	50
			*9.4	0.6	—	
Juice, Mandarin type	120	½ c.	10.0	1.1	0.4	50
			9.2	0.9	0.3	
Juice, canned	120	½ c.	10.8	0.7	0.1	50
			*9.0	0.6	0.1	
Marmalade, com.	25	1 T.	17.5	0.1	—	70
			*69.9	0.3	Trace	
Peel, candied	10	1 sm. piece	8.1	—	—	35
			80.6	0.4	0.3	
Ovaltine, A.P.	9	1 T.	4.3	0.9	4.4	60
			72.1	14.3	7.4	
Oxo (cubes)	5		0	1.6	0.2	8
			0	31.9	3.8	
Oxo (extract)	10	1 heaping t.	0.1	1.6	0	8
			1.0	16.0	0	
Oxtail soup, canned, conc.	140	½ c.	11.9	5.5	2.4	95
			8.5	3.9	1.7	
Oysters:						
"Lynnhaven" (lg.)	135	6 (⅔ c.)	5.0	8.3	1.6	70
			3.7	6.2	1.2	
"Cape Cod" (med.)	110	6 (½ c.)	4.0	6.8	1.3	55
			3.7	6.2	1.2	
"Blue Point" (sm.)	100	6	3.7	6.2	1.2	50
			3.7	6.2	1.2	
Canned	60	⅓ c.	2.3	5.3	1.4	45
			3.9	8.8	2.4	
Solids	120	½ c.	4.0	7.2	1.6	60
			3.3	6.0	1.3	
Oyster soup, cream of, canned	240	1 c.	10.5	3.6	4.1	95
			4.4	1.5	1.7	
Oyster plant (salsify)	100	2, 6″ long	15.5	3.5	1.0	85
			15.5	3.5	1.0	
Oyster plant, cooked	80	½ c.	7.2	0.9	Trace	35
			9.0	1.2	0.1	

P

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Pai-tsai, Chinese cabbage	110	1 c.	2.6	1.5	0.1	20
			2.4	1.4	0.1	

* Largely assimilable.
Blank space indicates lack of data.
‡ Gross fat removed.
Negligible quantity is designated by —.

P

	Size of portion.		Value of portion.			
Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Pakchoi, see Chinese cabbage.						
Palmetto buds, see Palmetto cabbage.						
Palmetto cabbage	100	¾ c.	6.1	3.3	0.6	45
			6.1	3.3	0.6	
Palmetto cabbage, cooked	100	½ c.	5.6	2.9	0.5	40
			5.6	2.9	0.5	
Pancake flour, see Flours.						
Pancakes	50	3	18.2	2.5	7.5	155
			*36.4	5.1	15.1	
Pancreas, fresh:						
Beef, thin	100	2		14.9	17.0	220
				14.9	17.0	
Medium	100	2		13.5	25.0	290
				13.5	25.0	
Fat	100	2		12.8	29.0	320
				12.8	29.0	
Very fat	100	2		11.8	34.0	365
				11.8	34.0	
Calf	100			19.2	8.8	160
				19.2	8.8	
Hog	100			14.5	23.8	280
				14.5	23.8	
Papaw, tropical, see Papaya.						
Papaw	50	1, 4″ long	8.4	2.6	0.4	50
			16.8	5.2	0.9	
Papaya (melon pawpaw)	100	⅛, 5″ diam.	10.0	0.6	0.1	45
			10.0	0.6	0.1	
Papaya, Florida	120	$\frac{1}{10}$ av.	6.9	0.4	0.6	35
			*5.8	0.3	0.5	
Parmesan cheese	5	2 t. grated		2.2	1.0	20
				43.5	19.1	
Parmesan cheese, Formaggio	5	2 t.		2.5	1.1	20
				49.4	22.7	
Parmesan cheese, Reggiano	5	2 t.		1.7	1.4	20
				34.8	27.3	
Parsley leaves	1	1 t.	0.1	Trace	Trace	—
			9.0	3.7	1.0	
Parsley roots, Hamburg	100		8.1	2.1	0.2	45
			8.1	2.1	0.2	
Parsnip leaves	25	½ c.	1.6	0.5	—	9
			6.3	2.0	—	
Parsnips	120	¾ c., diced	13.2	1.8	0.6	70
			*11.0	1.5	0.5	
Parsnips, boiled	80	½ c.	8.0	1.0	0.3	40
			*10.0	1.3	0.4	
Partridge, roast	115	¼ lb.		40.5	8.3	245
				35.2	7.2	
Passion fruit	50	2 med.	3.1	1.4	—	20
			*6.2	2.8	—	
Passion fruit juice, natural	30	1 oz.	3.5	0.4	—	15
			*11.5	1.4	—	
Passion fruit juice, purple or granadilla	30	1 oz.	5.7	0.2	—	25
			19.1	0.6	—	
Passion fruit beverage	240	1 c.	33.5	0.2	—	140
			*14.0	0.1	—	
Pastry, flaky, baked	25		10.9	1.5	8.9	135
			*43.5	5.9	35.8	
Pastry, short, baked	25		13.7	1.8	7.6	135
			*54.8	7.3	30.4	
Pâté de foie gras	6	1 t.	0.3	0.7	2.6	30
			4.8	11.4	13.8	

P

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Patience dock	25	½ c.	**8.0**	**1.0**	**0.3**	**40**
			*10.0	1.3	0.4	
Pea meal	100	¾ c.	**28.0**	**35.9**	**17.5**	**390**
			28.0	35.9	17.5	
Pea soup, canned, conc.	140	½ c.	**17.4**	**6.7**	**2.2**	**120**
			12.4	4.8	1.6	
Pea soup, cream of, canned	240	1 c.	**15.4**	**4.8**	**8.6**	**165**
			6.4	2.0	3.6	
Peaches:	150	2, 2″ diam.	**13.2**	**0.8**	**0.2**	**60**
			*8.8	0.5	0.1	
Georgia	150	1 lg.	**14.1**			**60**
			*9.4			
Maryland	150	1 lg.	**12.9**			**55**
			*8.6			
North Carolina	150	1 lg.	**13.8**			**55**
			*9.2			
New Jersey	150	1 lg.	**11.4**			**45**
			*7.6			
Peaches, canned, water pack	140	2 halves	**6.4**	**0.7**	**0.1**	**30**
			*4.6	0.5	0.1	
Peaches, canned, juice pack	140	2 halves	**10.2**	**0.6**	**0.3**	**45**
			*7.3	0.4	0.2	
Peaches, canned, in syrup	140	2 halves	**25.5**	**0.6**	**0.1**	**110**
			18.2	0.4	0.1	
Peaches, canned, also see Fruits, canned						
Peaches, dried	50	3, 1¾″ diam.	**26.5**	**1.7**	**—**	**115**
			*53.0	3.4	—	
Peach jam	25	1 T.	**16.2**	**0.2**	**—**	**65**
			57.0	0.7	Trace	
Peach juice	120	½ c.	**15.4**	**0.2**	**—**	**65**
			12.8	0.2	—	
Peanuts	60	30	**5.1**	**16.9**	**29.4**	**360**
			*8.6	28.1	49.0	
Peanut:						
Brittle	15	1½″ x 3″	**10.1**	**1.8**	**2.7**	**75**
			67.0	12.0	18.0	
Butter	15	1 T.	**2.6**	**4.4**	**7.0**	**95**
			17.1	29.3	46.5	
Butter, com.	15	1 T.	**1.7**	**3.8**	**7.5**	**90**
			11.0	25.0	50.0	
Cookies	10	1	**5.4**	**1.4**	**2.8**	**55**
			53.5	14.0	27.5	
Flour	100	1¼ c.	**36.5**	**51.2**	**5.0**	**405**
			36.5	51.2	5.0	
Meal	100	1¼ c.	**6.7**	**51.6**	**10.5**	**335**
			*6.7	51.6	10.5	
Meal, high grade	100	1¼ c.	**21.7**	**50.9**	**7.5**	**365**
			21.7	50.9	7.5	
Meal, med. grade	100	1¼ c.	**23.0**	**44.9**	**8.8**	**360**
			23.0	44.9	8.8	
Oil	115	½ c.	**—**	**—**	**115.0**	**1070**
			—	—	100.0	
Pears:						
Bartlett	150	1, 3″ long	**12.5**	**0.6**	**0.6**	**60**
			*8.3	0.4	0.4	
Canned, water pack	120	2 halves	**4.9**	**0.4**	**0.1**	**25**
			*4.1	0.3	0.1	
Canned, juice pack	120	2 halves	**9.6**	**0.2**	**0.1**	**40**
			*8.0	0.2	0.1	
Canned, in syrup	120	2 halves	**22.1**	**0.2**	**0.1**	**90**
			18.4	0.2	0.1	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Pears:						
Canned, see also Fruits canned.						
Candied	30	1 oz.	**22.8**	**0.4**	**0.2**	**95**
			75.9	1.3	0.6	
Dried	75	4 halves	**27.0**	**1.7**	**0.3**	**120**
			*36.0	2.3	0.4	
Prickly	100	1 av.	**10.4**	**0.8**	**—**	**45**
			10.4	0.8	—	
Pear jam	25	1 T.	**14.0**	**0.2**	**—**	**60**
			56.0	0.7	Trace	
Peas, black-eye, see Cowpeas.						
Green, very young	75	½ c.	**7.5**	**4.2**	**0.2**	**40**
			10.0	5.5	0.3	
Green, av.	75	½ c.	**8.0**	**4.3**	**0.4**	**55**
			*10.6	5.8	0.5	
Green, very old	75	½ c.	**19.5**	**6.0**	**0.3**	**105**
			26.0	8.0	0.4	
Green, cooked	70	½ c.	**5.4**	**3.5**	**—**	**35**
			*7.7	5.0	—	
Marrowfat	80	½ c.	**8.8**	**5.3**	**—**	**60**
			11.0	6.7	—	
"Petits pois"	75	½ c.	**5.2**	**2.5**	**—**	**30**
			7.0	3.4	—	
Very young, canned	70	½ c.	**6.0**	**2.5**	**0.1**	**35**
			*8.6	3.6	0.2	
Young, canned	70	½ c.	**7.8**	**3.2**	**0.1**	**55**
			11.2	4.6	0.2	
Dried	100	½ c.	**57.5**	**24.6**	**1.0**	**345**
			*57.5	24.6	1.0	
Dried, boiled	120	½ c.	**22.9**	**8.3**	**—**	**130**
			*19.1	6.9	—	
Split, boiled	120	½ c.	**26.3**	**10.0**	**—**	**150**
			*21.9	8.3	—	
Pecans	25	6 (whole)	**1.9**	**2.4**	**18.2**	**185**
			*3.9	9.4	73.0	
Pep, Kellogg	30	¾ c.	**23.1**	**3.7**	**0.6**	**115**
			77.1	12.2	1.9	
Peppers:						
Green, sweet	25	3″ piece	**1.0**	**0.2**	Trace	**5**
			4.1	0.8	0.1	
Green, dried	5	1 t.	**3.1**	**0.8**	**0.4**	**20**
			63.0	15.5	8.5	
Neapolitan	25	3″ piece	**1.4**	**0.3**	**0.1**	**8**
			5.7	1.1	0.3	
Red, fresh	25	3″ piece	**2.0**	**0.3**	**0.2**	**11**
			8.1	1.3	0.7	
Red, dried	5	1 t.	**3.5**	**0.5**	**0.4**	**20**
			70.0	9.4	7.7	
Pepper-pot soup, canned, conc.	140	½ c.	**11.5**	**6.4**	**4.2**	**115**
			8.2	4.6	3.0	
Pepper-pot soup, canned	240	1 c.	**12.0**	**5.5**	**3.1**	**100**
			5.0	2.3	1.3	
Perch, white	100			**19.3**	**4.0**	**115**
				19.3	4.0	
Perch, yellow	100			**18.7**	**0.8**	**85**
				18.7	0.8	
Persimmons, American	50	1 sm.	**9.5**	**0.4**	**0.2**	**40**
			*18.9	0.8	0.4	
Persimmons, Japanese	100	1 lg.	**15.9**	**0.8**	**0.4**	**70**
			*15.9	0.8	0.4	
Pet milk, evaporated	15	1 T.	**1.5**	**1.1**	**1.2**	**20**
			*9.8	7.1	7.9	
Pettijohn's, Quaker	20	2 T.	**14.7**	**2.0**	**0.4**	**70**
			73.3	10.1	1.9	

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Petty rice, see Quinoa.						
Pheasant	230	½ lb.		**56.1**	**11.0**	**335**
				24.4	4.8	
Pheasant, roasted	115	¼ lb.		**35.4**	**10.7**	**245**
				30.8	9.3	
Pickerel (pike)	230	½ lb.		**43.0**	**1.2**	**190**
				18.7	0.5	
Pickled tripe	115	¼ lb.		**23.6**	**2.3**	**120**
				20.5	2.0	
Pickles:						
Cucumber, fresh, com.	20	3 sl.	**3.2**	**0.2**	**—**	**14**
			15.9	1.2	0.2	
Dill	50	1 med.	**1.4**	**0.2**	**0.1**	**5**
			2.7	0.5	0.3	
Mixed, chopped	20	1 T.	**0.8**	**0.2**	**—**	**4**
			4.0	1.1	0.4	
Onions, sour, com.	10	2	**0.1**	**—**	**—**	**0**
			1.0	0.2	Trace	
Onions, sweet, com.	10	2	**3.7**	**—**	**—**	**15**
			37.0	0.1	Trace	
Sour, chopped, com.	20	1 T.	**—**	**0.1**	**0.1**	**1**
			Trace	0.5	0.3	
Sweet, chopped, com.	20	1 T.	**7.2**	**0.1**	**0.1**	**30**
			36.0	0.5	0.3	
Sweet, mustard, chopped, com.	25	1 T.	**6.3**	**—**	**0.2**	**25**
			25.0	Trace	0.8	
Pidan (Chinese preserved egg)	100	1 lg.	**—**	**26.8**	**18.5**	**285**
			—	26.8	18.5	
Pies:						
Apple	100	1 sl.	**32.6**	**2.3**	**8.7**	**225**
			*32.6	2.3	8.7	
Custard	100	1 sl.	**27.7**	**5.5**	**14.4**	**270**
			*27.7	5.5	14.4	
Gooseberry	100	1 sl.	**31.0**	**2.8**	**9.4**	**225**
			*31.0	2.8	9.4	
Mince	100	1 sl.	**42.6**	**4.7**	**19.7**	**375**
			*42.6	4.7	19.7	
Rhubarb	100	1 sl.	**29.8**	**2.6**	**9.4**	**220**
			*29.8	2.6	9.4	
Pigeon, red meat	20	1 av.	**0.2**	**3.6**	**1.2**	**25**
			1.2	17.9	6.2	
Pigeon, white meat	80	1 av.	**0.2**	**12.0**	**4.2**	**50**
			0.3	17.5	5.2	
Pigeon, whole	180	1 av.	**0.5**	**33.4**	**22.5**	**350**
			0.3	18.5	12.5	
Pigeon, roasted	80	1 lg.		**21.4**	**10.6**	**185**
				26.8	13.2	
Pigeon, see also Squab.						
Pignolias	10	1 T.	**0.7**	**3.4**	**4.9**	**60**
			*6.9	33.9	49.4	
Pig's blood, prepared, Chinese	100			**9.7**	**1.1**	**50**
				9.7	1.1	
Pig's feet, boiled	115	¼ lb.	**0.7**	**16.6**	**12.1**	**185**
			0.6	14.4	10.5	
Pig's feet, pickled	115	¼ lb.		**18.7**	**17.0**	**235**
				16.3	14.8	
Pike (pickerel)	230	½ lb.		**43.0**	**1.2**	**190**
				18.7	0.5	
Pilchard	50	3 av.	**0.6**	**7.6**	**2.7**	**60**
			1.3	15.3	5.2	
Pilchard, canned	50	3 av.		**8.0**	**7.5**	**105**
				16.0	15.0	

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P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Pilot Bread	25	1 cracker	18.6 74.2	2.8 11.1	1.3 5.0	100
Pimento (cheddar) cheese	20	1 cu. in.		3.2 16.0	6.4 32.2	75
Pimento cheese, Kraft	30	⅛″ sl. 5# loaf		6.6 22.0	9.1 30.5	110
Pimentos, canned	11	1 t.	0.8 6.8	0.1 0.9	Trace 0.3	4
Pine nuts (pignolias)	10	1 T.	0.7 *6.9	3.4 33.9	4.9 49.4	60
Pine nuts (piniones)	10	1 T.	2.6 *26.2	0.6 6.5	6.0 60.7	70
Pine nuts (sabine)	10	1 T.	0.8 *8.4	2.8 28.1	5.4 53.7	65
Pineapple:						
Fresh	150	1 c. diced	13.9 *9.3	0.6 0.4	0.5 0.3	65
Canned, water pack	150	2 sl.	15.2 *10.1	0.4 0.3	0.1 0.1	65
Canned, juice pack	150	2 sl.	18.8 *12.5	0.6 0.4	0.1 0.1	80
Canned, in syrup	150	2 sl.	27.9 *18.6	0.6 0.4	0.1 0.1	120
Canned, see also Fruits, canned.						
Candied	50	1 sl.	40.0 80.0	0.4 0.8	0.2 0.4	165
Extract, Burnett, A.P.	6	1 t.	2.8 47.0	0 0	0 0	12
Juice	120	½ c.	15.4 12.8	0.4 0.3	0.4 0.3	70
Juice, natural, canned, Hawaiian	120	½ c.	15.9 *13.3	0.4 0.3	0.4 0.3	70
Piñon	10	1 T.	1.7 *17.3	1.5 14.6	6.2 61.9	70
Pisang or banana flour	100	¾ c.	72.5 72.5	3.5 3.5	0.8 0.8	320
Pistachios	20	¼ c.	3.3 16.3	4.5 22.3	10.8 54.0	130
Pistachio extract, imitation, Burnett, A.P.	5	1 t.	0 0	0 0	0 0	0
Plaice, fried	115	¼ lb.	8.0 *7.0	20.7 18.0	16.6 14.4	270
Plaice, steamed	115	¼ lb.		20.8 18.1	2.2 1.9	105
Plantain (baking banana)	100		32.0 32.0	1.5 1.5	0.4 0.4	140
Plums:						
Fresh	50	2, 2½″ long	4.2 *8.3	0.4 0.7	0.1 0.2	20
Canned, water pack	100	3, ½ c.	4.5 *4.5	0.4 0.4	0.1 0.1	20
Canned, in syrup	100	3, ½ c.	20.4 20.4	0.4 0.4	0.1 0.1	115
Canned, see also Fruits, canned.						
Damson	50	4 med.	4.8 *9.6	0.2 0.5	— —	20
Greengage	50	3 med.	5.9 *11.8	0.4 0.8	— —	25
Prune, fresh	50	2 med.	6.7 *13.3	0.5 0.9	0.1 0.2	30
Prune, see also Prunes.						
Japanese, red, pickled	100		4.9 4.9	0.5 0.5	1.3 1.3	35

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Plum jam	25	1 T.	12.2	0.3	—	50
			49.0	1.1	Trace	
Plum pudding, canned	90	3 oz.	29.7	4.1	12.6	255
			33.0	4.5	14.0	
Plum pudding, English, canned	90	3 oz.	46.9	3.9	7.3	275
			52.1	4.3	8.1	
Plum pudding, Heinz	90	3 oz.	42.2	3.8	9.3	275
			46.9	4.2	10.3	
Poi, Hawaiian[1]	230	1 c.	34.5	2.1	0.2	150
			15.0	0.9	0.1	
Poi, Hawaiian[2]	100		28.6	0.3	0.1	120
			*28.6	0.3	0.1	
Poi, Hawaiian, sour	100		9.8			40
			*9.8			
Pokeberry	100		3.7	2.6	0.4	30
			3.7	2.6	0.4	
Pollack	230	½ lb.		49.7	1.8	220
				21.6	0.8	
Pollack, fried	115	¼ lb.	7.6	19.0	7.9	185
			*6.6	16.5	6.9	
Pollack, steamed	115	¼ lb.		22.4	0.9	100
				19.5	0.8	
Pomegranates	155	½, 6½" diam.	26.0	2.3	2.5	140
			*16.8	1.5	1.6	
Pomegranates, Florida	250	1 av.	17.8	1.2	2.2	105
			*7.1	0.5	0.9	
Pomegranate juice	120	½ c.	13.9	0.2	—	60
			*11.6	0.2	—	
Pompano	230	½ lb.		43.2	17.3	340
				18.8	7.5	
Pont l'Evêque cheese	20	1½" x 1" x ½"	1.3	4.1	5.0	70
			*6.7	20.3	25.0	
Pont l'Evêque cheese, American	20	1½" x 1" x ½"		5.0	5.9	75
				25.2	29.3	
Pop corn, popped	15	1 c.	11.8	1.6	0.8	60
			78.7	10.7	5.0	
Porgy	230	½ lb.		42.8	11.7	285
				18.6	5.1	
Pork, fresh:						
Brains	115	¼ lb.		13.5	11.9	165
				11.7	10.3	
Chops, loin, lean	230	½ lb.		46.7	43.7	600
				20.3	19.0	
Chops, loin, medium	230	2, ½ lb.		38.2	69.2	800
				16.6	30.1	
Chuck ribs and shoulder	230	½ lb.		39.8	71.5	830
				17.3	31.1	
Ham, lean	230	½ lb.		57.5	33.1	545
				25.0	14.4	
Ham, medium	230	½ lb.		35.2	66.5	770
				15.3	28.9	
Heart	115	¼ lb.		19.7	7.2	150
				17.1	6.3	
Kidney	115	¼ lb.	0.8	17.8	5.6	130
			0.7	15.5	4.8	
Liver	230	½ lb.	3.2	49.2	10.4	310
			1.4	21.4	4.5	
Lungs	115	¼ lb.		13.7	4.6	100
				11.9	4.0	
Middle cuts	230	½ lb.		36.1	83.5	925
				15.7	36.3	

[1] 83 per cent water, as eaten.
[2] 69 per cent water, as prepared.
* Largely assimilable.
‡ Gross fat removed.
Blank space indicates lack of data.
Negligible quantity is designated by —.

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Pork, fresh:						
Side	230	½ lb.		20.9	127.2	1270
				9.1	55.3	
Shoulder	230	½ lb.		30.6	87.7	940
				13.3	34.2	
Tenderloin	230	½ lb.		43.5	29.9	455
				18.9	13.0	
Pork, cooked:						
Bacon, back, pea-mealed, Canadian, fried	60	⅛ lb.		16.2	2.8	90
				27.1	4.6	
Bacon, breakfast, broiled crisp	20	4 str., 7″ long (raw)		7.2	9.1	115
				35.8	45.6	
‡Chop, broiled	115	¼ lb.		32.9	8.3	215
				28.6	7.2	
Chop, grilled, lean	100	1 chop		25.3	23.7	325
				25.3	23.7	
Chop, grilled, med. fat	100	1 chop		18.6	50.3	545
				18.6	50.3	
‡Ham, baked or boiled	115	¼ lb.		30.3	5.7	175
				26.4	4.9	
‡Ham, broiled	115	¼ lb.		33.0	5.0	180
				28.7	4.3	
Ham, deviled	20	1 T.		3.8	6.8	80
				19.0	34.1	
Ham, smoked, parboiled and baked	115	¼ lb.		32.2	4.4	175
				28.0	3.8	
‡Leg, roasted	115	¼ lb.		38.4	5.2	205
				33.4	4.5	
Leg, roasted, med. fat	115	¼ lb.		28.3	26.7	365
				24.6	23.2	
‡Loin, roasted	115	¼ lb.		34.1	6.4	200
				29.7	5.6	
Loin, roasted, lean	115	¼ lb.		27.1	23.1	325
				23.6	20.1	
Loin, roasted, med. fat	115	¼ lb.		22.4	46.5	525
				19.5	40.4	
Loin, smoked, lean, cooked	115	¼ lb.		27.3	18.1	280
				23.7	15.7	
Pig's feet, boiled	115	¼ lb.	0.7	16.6	12.1	185
			0.6	14.4	10.5	
Roasted, cold	115	¼ lb.		37.5	22.6	365
				32.6	19.7	
Sausage, fried	60	2 oz.	7.6	6.9	14.9	200
			*12.7	11.5	24.8	
Stomach, cooked	115	¼ lb.	0	19.0	10.4	175
			0	16.5	9.0	
Pork, miscellaneous:						
Bacon, smoked	80	4 str. 8½″ long		8.4	51.8	515
				10.5	64.8	
Dry-salted backs	115	¼ lb.		8.9	83.6	815
				7.7	72.7	
Dry-salted bellies	115	¼ lb.		9.7	83.0	810
				8.4	72.2	
Fat, salt	60	2 oz.		1.0	51.7	480
				1.9	86.2	
Ham, smoked, lean	230	½ lb.		45.5	47.8	630
				19.8	20.9	
Ham, smoked, medium fat	230	½ lb.		37.5	89.2	995
				16.3	38.8	
Head cheese	200	1, ⅜″ sl.	—	39.0	67.6	790
			—	19.5	33.8	

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Pork, miscellaneous:						
Pig's feet, pickled	115	¼ lb.		**18.7** 16.3	**17.0** 14.8	235
Pig's tongue, pickled	115	¼ lb.		**20.4** 17.7	**22.8** 19.8	295
Sausage	35	2, 3½" long	**0.4** 1.1	**4.5** 13.0	**15.5** 44.2	165
Sausage, Arles	115	¼ lb.		**30.8** 26.8	**58.2** 50.6	700
Sausage (pork and beef)	60	⅛ lb.		**11.6** 19.4	**14.5** 24.1	180
Shoulder, smoked, medium fat	230	½ lb.		**36.6** 15.9	**74.8** 32.5	845
Port du Salut cheese	25	1½" x 1" x ¾"		**5.3** 21.2	**6.3** 25.2	80
Postum Cereal	2	1 t.	**1.4** 68.8	**0.3** 12.3	**0.1** 2.7	7
Postum, Instant	2	1 t.	**1.7** 82.3	**0.1** 6.6	**0** 0	6
Potatoes:						
Sweet	150	1, 6" x 1¾"	**39.2** *26.1	**2.7** 1.8	**1.1** 0.7	180
Sweet, baked	100	½ lg.	**32.2** 32.2	**2.1** 2.1	**0.8** 0.8	150
Sweet, boiled	100	1 med.	**20.1** *20.1	**1.1** 1.1	**0.5** 0.5	90
Sweet, canned	75	2 sm.	**31.1** 41.4	**1.4** 1.9	**0.3** 0.4	135
White	100	1 med.	**18.0** *18.0	**2.2** 2.2	**0.1** 0.1	85
White, baked	150	1 med.	**38.1** 25.4	**4.6** 3.1	**0.1** 0.1	175
White, new, boiled	100	3 sm.	**18.3** *18.3	**1.6** 1.6	**—** —	80
White, old, boiled	150	1 med.	**29.6** *19.7	**2.1** 1.4	**—** —	130
French fried	110	1 heaping c.	**41.0** *37.3	**4.2** 3.8	**9.9** 9.0	275
Roasted	150	1 med.	**41.0** *27.3	**4.2** 2.8	**1.5** 1.0	200
White, desiccated	100		**80.9** 80.9	**8.5** 8.5	**0.4** 0.4	370
Potato chips, Saratoga	30	1⅓ c.	**14.0** 46.7	**2.0** 6.8	**11.9** 39.8	175
Potato flour	100	⅔ c.	**83.0** 83.0	**0.5** 0.5	**0.1** 0.1	345
Potato soup	250	1 c.	**27.5** *11.0	**5.2** 2.1	**11.0** 4.4	235
Prawn paste	6	1 t.		**1.3** 21.6	**0.5** 8.6	10
Prawns	110	8 lg.		**25.1** 22.8	**1.4** 1.3	115
Prawns, cooked	60	2 oz.		**12.7** 21.2	**1.0** 1.8	60
Prawns, canned	60	2 oz.		**13.9** 23.2	**0.8** 1.5	65
Preserves, jellies, com.	12	1 t.	**7.7** 64.0	**—** —	**—** —	30
Pretzels	25	6 med.	**18.2** 72.8	**2.4** 9.7	**1.0** 3.9	95
Prickly pear	100	1 av.	**10.4** 10.4	**0.8** 0.8	**—** —	45

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Primost cheese, Mysost	30	1 oz.		**4.2**	**10.3**	**115**
				14.0	34.5	
Printanier soup, canned, conc.	140	½ c.	**1.4**	**8.5**	**—**	**40**
			1.0	6.1	—	
Provolone, Italian cheese . .	30	1 oz.		**10.2**	**7.5**	**110**
				34.2	25.1	
Prunes:						
Fresh	50	2 med.	**6.7**	**0.5**	**0.1**	**30**
			*13.3	0.9	0.2	
Canned, water pack . . .	100	3, ½ c.	**6.4**	**0.4**	**0.1**	**30**
			*6.4	0.4	0.1	
Canned, juice pack . . .	100	3, ½ c.	**19.0**	**0.4**	**0.1**	**80**
			19.0	0.4	0.1	
Canned, in syrup . . .	100	3, ½ c.	**22.3**	**0.5**	**0.1**	**95**
			22.3	0.5	0.1	
Dried	100	8 lg.	**40.3**	**2.4**	**—**	**175**
			*40.3	2.4	—	
Dried, cooked	100	4 med.	**29.3**	**0.8**	**—**	**125**
			29.3	0.8	—	
Juice	120	½ c.	**34.6**	**1.0**	**0**	**145**
			28.8	0.8	0	
Juice, canned	120	½ c.	**15.6**	**0.5**	**0**	**65**
			*13.0	0.4	0	
Meat	100	½ c.	**21.5**	**1.2**	**—**	**95**
			21.5	1.2	Trace	
Puddings:						
Apple dumpling	100		**28.1**	**2.4**	**9.3**	**210**
			*28.1	2.4	9.3	
Banana custard	50		**8.9**	**1.2**	**1.3**	**55**
			*17.9	2.5	2.6	
Blanc-mange	50		**9.1**	**1.6**	**1.8**	**60**
			*18.2	3.2	3.7	
Chocolate cornstarch . .	50		**10.6**	**1.6**	**1.9**	**70**
			*21.2	3.3	3.8	
Custard, egg, baked . .	50		**4.7**	**2.6**	**2.9**	**55**
			*9.4	5.2	5.9	
Boiled	50		**6.3**	**2.3**	**2.6**	**60**
			*12.7	4.7	5.3	
Date, Heinz	50		**24.1**	**1.7**	**4.9**	**150**
			48.2	3.5	9.9	
Fig, Heinz	50		**24.5**	**2.0**	**6.0**	**165**
			49.0	4.0	12.1	
Plum, Heinz	90	3 oz.	**42.2**	**3.8**	**9.3**	**275**
			46.9	4.2	10.3	
Rice (with milk) . . .	100		**20.8**	**4.5**	**9.3**	**190**
			*20.8	4.5	9.3	
Sago (with milk) . . .	100		**5.8**	**0.9**	**1.1**	**40**
			*5.8	0.9	1.1	
Semolina (with milk) . .	100		**5.5**	**1.2**	**1.1**	**40**
			*5.5	1.2	1.1	
Suet	100		**36.6**	**4.3**	**18.1**	**335**
			*36.6	4.3	18.1	
With raisins .	100		**40.8**	**3.8**	**15.6**	**330**
			*40.8	3.8	15.6	
Tapioca (with milk) . .	100		**20.8**	**3.2**	**3.8**	**135**
			*20.8	3.2	3.8	
Puddings for babies, see pages 141 *to* 147						
Puffed corn .	23	1 c.	19.4	2.2	0.1	90
			84.3	9.6	0.4	
Puffed Rice, Quaker	15	1 c.	13.3	0.9	—	60
			88.8	6.2	0.2	
Puffed Wheat, Quaker . .	15	1 c.	11.3	2.3	0.2	55
			75.4	15.6	1.6	
Pumpernickel bread	25	1 sl.	12.4	1.7	0.3	50
			49.7	6.7	1.2	

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Pumpkin	120	¾ c.	**4.8**	**1.2**	**0.1**	25
			*4.0	1.0	0.1	
Pumpkin, canned	125	½ c.	**8.4**	**1.0**	**0.3**	40
			6.7	0.8	0.2	
Puréed foods, see page 703.						
Purslane	100		**2.5**	**1.6**	**6.4**	20
			*2.5	1.6	6.4	

Q

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Quail	100	1 whole		**24.0**	**6.4**	160
				24.0	6.4	
Quail, broiled	100	1 whole		**22.0**	**6.0**	145
				22.0	6.0	
Quinces	240	1, 3″ x 2½″	**1.4**	**0.7**	**0.2**	10
			*0.6	0.3	0.1	
Quince juice	120	½ c.	**10.9**	**0.4**	**—**	45
			*9.1	0.3	—	
Quince-apple jam	25	1 T.	**13.5**	**0.2**	**—**	55
			54.0	0.7	Trace	
Quinoa, dry seed	100		**58.6**	**22.8**	**5.7**	385
			*58.6	22.8	5.7	
Quinoa flour, "petty rice"	100	¾ c.	**60.0**	**19.0**	**5.0**	370
			*60.0	19.0	5.0	
Quinoa, leafy shoots	100			**2.4**	**0.2**	10
				2.4	0.2	

R

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
‡Rabbit, front quarter, boiled	115	¼ lb.		**31.6**	**1.1**	140
				27.5	1.0	
‡Rabbit, hind quarter, boiled	115	¼ lb.		**33.2**	**1.3**	150
				28.9	1.1	
‡Rabbit, front quarter, broiled	115	¼ lb.		**34.6**	**4.9**	185
				30.1	4.3	
‡Rabbit, hind quarter, broiled	115	¼ lb.		**35.6**	**2.8**	170
				31.0	2.4	
Rabbit, stewed	115	¼ lb.		**30.6**	**8.9**	210
				26.6	7.7	
Radishes	50	6 med.	**1.7**	**0.7**	**0.1**	11
			*3.5	1.3	0.1	
Raisins, Muscat, dried (seeded)	75	½ c.	**48.3**	**0.8**	**—**	200
			*64.4	1.1	—	
Raisins, Sultana or Thompson seedless, dried	60	½ c.	**38.8**	**1.0**	**—**	165
			*64.7	1.7	—	
Ralston, Shredded	30	½ c.	**23.2**	**2.6**	**0.3**	110
			74.0	8.5	1.0	
Ralston, wheat cereal	30	¼ c.	**21.0**	**4.5**	**0.5**	110
			70.0	15.0	1.7	
Raspberries:						
Black	75	⅔ c.	**7.3**	**1.3**	**0.8**	45
			*9.7	1.7	1.0	
Red	75	⅔ c.	**7.3**	**0.8**	**0.4**	35
			*9.7	1.0	0.6	
Canned, water pack	140	⅔ c.	**14.0**	**1.3**	**1.3**	75
			10.0	0.9	0.9	
Canned, juice pack	140	⅔ c.	**18.2**	**0.8**	**0.6**	85
			13.0	0.6	0.4	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

R

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Raspberries:						
Canned, in syrup	140	⅔ c.	**38.9**	**0.8**	**0.7**	**170**
			27.8	0.6	0.5	
Canned, see also Fruits, canned.						
Dried	40	¼ c.	**32.1**	**2.9**	**0.7**	**150**
			80.2	7.3	1.8	
Raspberry, black, juice	120	½ c.	**12.8**	**0.2**	**—**	**55**
			10.7	0.2	—	
Raspberry, red, juice	120	½ c.	**10.0**	**0.5**	**—**	**45**
			8.3	0.4	—	
Raspberry extract, Burnett, A.P.	6	1 t.	**2.8**	**0**	**0**	**12**
			47.0	0	0	
Raspberry jam	25	1 T.	**14.3**	**0.2**	**—**	**60**
			57.3	0.7	Trace	
Red banana	140	1	**32.0**	**1.8**	**1.1**	**150**
			22.7	1.3	0.8	
Red cabbage	60	½ c.	**3.5**	**1.1**	**0.1**	**20**
			5.8	1.8	0.2	
Reindeer, see Venison.						
Reindeer milk cheese	30	1 oz.	**0.9**	**7.1**	**12.9**	**155**
			*3.0	23.8	43.1	
Relish, pickle, com.	25	1 T.	**7.0**	**0.1**	**0.1**	**30**
			28.0	0.5	0.3	
Rhubarb	90	1 c. diced	**2.3**	**0.5**	**0.6**	**20**
			*2.5	0.6	0.7	
Rhubarb, cooked without sugar	100	⅔ c.	**2.2**	**0.4**	**0.4**	**15**
			2.2	0.4	0.4	
Rhubarb, canned, water pack	100	⅔ c.	**3.0**	**0.4**	**0.4**	**18**
			3.0	0.4	0.4	
Rhubarb pie	100	1 sl.	**29.8**	**2.6**	**9.4**	**220**
			*29.8	2.6	9.4	
Rice:						
Fermented, Japanese	100		**69.6**	**5.5**	**0.2**	**310**
			69.6	5.5	0.2	
Hulled	20	1 heaping T.	**15.4**	**1.4**	**0.4**	**75**
			*76.8	7.2	2.0	
Natural brown, White House	20	1 heaping T.	**15.3**	**1.3**	**0.5**	**70**
			76.1	6.7	2.2	
Polished	20	1 heaping T.	**15.5**	**1.4**	**0.1**	**70**
			*77.4	6.9	0.4	
White, White House	20	1 heaping T.	**16.2**	**1.3**	**0.1**	**75**
			81.0	6.4	0.6	
Wild (Indian)	20	⅙ c.	**13.1**	**2.8**	**0.2**	**65**
			65.4	14.0	0.9	
Boiled	100	½ c.	**22.5**	**2.3**	**0.9**	**110**
			22.5	2.3	0.9	
Rice Flakes, Heinz	30	1 c.	**25.0**	**3.2**	**0.3**	**120**
			83.2	10.5	0.9	
Rice Flakes, White House	30	1 c.	**24.4**	**2.7**	**0.6**	**115**
			81.2	8.9	2.0	
Rice flour	100	⅔ c.	**68.0**	**8.6**	**6.1**	**370**
			68.0	8.6	6.1	
Rice Krispies, Kellogg	30	1 c.	**26.5**	**1.8**	**0.1**	**115**
			88.4	6.0	0.3	
Rice polishings	100		**64.0**	**11.6**	**10.1**	**405**
			64.0	11.6	10.1	
Rice pudding (with milk)	100		**20.8**	**4.5**	**9.3**	**190**
			*20.8	4.5	9.3	
Rice, Puffed, Quaker	15	1 c.	**13.3**	**0.9**	**0.1**	**60**
			88.8	6.2	0.2	
Ricena, White House	20	1 heaping T.	**16.1**	**1.3**	**0.1**	**70**
			80.3	6.6	0.6	
Ricotta Romano, Italian cheese	50	¼ c.		**3.4**	**19.7**	**195**
				6.9	39.5	

R

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat	Value of portion. Cal.
Ricotta salata, Italian cheese	30	1 oz.	**0.6**	**4.1**	**15.4**	154
			2.0	13.8	51.3	
Rippled Wheat, Loose-Wiles	10	1 biscuit	**7.9**	**1.1**	**0.3**	40
			*78.8	11.1	2.5	
Robinson's Patent Barley	9	1 T.	**7.0**	**0.6**	**0.1**	35
			*78.3	6.6	1.0	
Robinson's Patent Groats	9	1 T.	**6.4**	**1.1**	**0.5**	35
			*71.5	12.4	6.0	
Roe, cod, fried	60	2 oz.	**2.4**	**12.4**	**7.1**	125
			*3.0	20.6	11.9	
Roe, herring, fried	60	2 oz.	**2.8**	**14.0**	**9.5**	155
			*4.7	23.4	15.8	
Roe, shad	140	½ lg.	**3.6**	**29.3**	**5.3**	185
			2.6	20.9	3.8	
Roe, sturgeon (caviar)	15	2 t.	**1.1**	**4.5**	**3.0**	50
			7.6	30.0	19.7	
Rolled Oats	20	¼ c.	**13.3**	**3.3**	**1.5**	80
			66.3	16.7	7.3	
Rolled Oats, cooked	120	½ c.	**16.8**	**4.2**	**1.8**	105
			14.0	3.5	1.5	
Rolls:						
French	40	1	**22.3**	**3.4**	**1.0**	115
			55.7	8.5	2.5	
Plain, enriched	50	1, 4½″ x 2½″	**27.0**	**4.1**	**3.0**	155
			54.1	8.2	6.1	
Sweet, unenriched	50	1	**28.0**	**3.9**	**2.7**	155
			56.0	7.8	5.4	
Vienna	50	1	**28.3**	**4.3**	**1.1**	145
			56.5	8.5	2.2	
Water	40	1	**21.7**	**3.6**	**1.2**	115
			54.2	9.0	3.0	
Romaine	50	5 leaves	**1.5**	**0.5**	—	8
			3.0	1.0	—	
Romano cheese (Pecorino)	30	1 oz.		**9.3**	**8.3**	115
				31.2	27.7	
Root beer	230	1 c.	**18.4**	—	—	75
			8.0	—	—	
Root beer beverage, Hires	230	1 c.	**21.4**	**0**	**0**	90
			*9.3	0	0	
Roquefort cheese	15	1″ x ½″ x 2½″	**0.3**	**3.4**	**4.4**	55
			*1.8	22.6	29.5	
Roquette (Rocket salad)	100		**0.3**	**0.7**	**0.4**	8
			*0.3	0.7	0.4	
Rose extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**	0
			0	0	0	
Runko, with malt	15	1 T.	**12.6**	**0.6**	**0.4**	60
			83.7	3.8	2.6	
Russian dressing	18	1 T.	**1.6**	**0.3**	**9.3**	95
			9.0	1.9	51.7	
Russian turnips	120	¾ c.	**8.7**	**1.3**	**0.1**	40
			*7.3	1.1	0.1	
Rutabagas (Swedish turnips)	120	¾ c.	**8.7**	**1.3**	**0.1**	40
			*7.3	1.1	0.1	
Rye bread	25	1 sl.	**13.3**	**2.3**	**0.2**	65
			53.2	9.0	0.6	
Rye bread, black	30	1 sl.	**14.7**	**2.9**	**0.2**	75
			48.9	9.6	0.6	
Rye bread, Jewish	30	1 sl.	**15.6**	**2.7**	**0.3**	80
			52.0	9.1	1.1	
Rye bread, whole	30	1 sl.	**11.4**	**3.6**	**0.2**	65
			34.7	11.9	0.6	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

R

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Rye, whole grain	30	¼ c.	**21.2**	**3.2**	**0.5**	105
			*70.8	10.6	1.7	
Rye, cream of	50	⅓ c.	**35.9**	**6.0**	**0.8**	180
			71.8	12.0	1.6	
Rye, flaked	30	1 c.	**22.7**	**3.0**	**0.4**	110
			*75.8	10.0	1.4	
Rye flour, see Flours.						
Rye meal	130	1 c.	**93.0**	**17.7**	**2.6**	465
			71.5	13.6	2.0	
Ry-Krisp, Ralston	6	1	**4.4**	**0.7**	**0.1**	20
			74.0	12.0	1.0	

S

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Sago	40	¼ c.	**37.6**	**0.1**	**0.1**	155
			*94.0	0.3	0.2	
Sago meal	100		**83.9**	**0.9**	**0.2**	350
			83.9	0.9	0.2	
Sago pudding (with milk)	100		**5.8**	**0.9**	**1.1**	40
			*5.8	0.9	1.1	
Salad dressings:						
Boiled	20	1 T.	**3.0**	**0.9**	**2.0**	35
			15.0	4.5	10.0	
French	11	2 t.	—	—	**6.6**	60
			—	—	60.0	
French, com.	11	2 t.	**2.0**	**0.1**	**3.9**	45
			*18.1	0.6	35.5	
Mayonnaise, com.	20	1 T.	**0.4**	**0.3**	**16.0**	150
			2.0	1.4	80.0	
Mineral oil (Mayonnaise type)	15	1 T.	**0.5**	**0.2**	**0.4**	7
			3.0	1.5	2.7	
Miracle Whip	20	1 T.	**1.7**	**0.2**	**10.2**	105
			8.5	1.2	50.9	
Russian	18	1 T.	**1.6**	**0.3**	**9.3**	95
			9.0	1.9	51.7	
Salad Cream, com.	20	1 T.	**2.0**	**0.4**	**5.6**	60
			10.0	2.0	28.0	
Thousand Island, com.	15	1 T.	**2.6**	**0.1**	**5.9**	65
			17.3	0.8	39.0	
Salami	60	2 oz.		**14.3**	**22.1**	265
				23.9	36.8	
Salmon:						
Raw	230	½ lb.		**50.6**	**29.4**	480
				22.0	12.8	
‡Boiled	115	¼ lb.		**29.5**	**1.4**	135
				25.7	1.2	
Boiled	115	¼ lb.	**6.2**	**22.7**	**11.7**	225
			5.4	19.7	10.2	
Steamed	115	¼ lb.		**22.0**	**14.9**	230
				19.1	13.0	
Canned, Atlantic	100	½ c.		**21.1**	**12.5**	200
				21.1	12.5	
Canned, Blueback	100	½ c.		**20.0**	**4.5**	125
				20.0	4.5	
Canned, Chinook	100	½ c.		**17.7**	**15.7**	220
				17.7	15.7	
Canned, Chum	100	½ c.		**20.7**	**6.7**	150
				20.7	6.7	
Canned, Coho	100	½ c.		**21.1**	**8.5**	165
				21.1	8.5	
Canned, Pink	100	½ c.		**21.4**	**7.0**	155
				21.4	7.0	

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Salmon:						
Canned, Sockeye	100	⅓ c.		20.8	11.2	190
				20.8	11.2	
Canned, steelhead trout	100	½ c.		21.3	9.0	170
				21.3	9.0	
Salmon paste	6	1 t.		1.2	0.5	9
				20.1	8.9	
Salmon-anchovy paste	6	1 t.	0.5	0.8	0.5	10
			*8.5	14.0	9.1	
Salmon-shrimp paste	6	1 t.	0.2	1.1	0.5	10
			*4.2	18.2	9.3	
Salsiccia, fresca di Napoli	60	2 oz.	0.4	6.8	14.5	165
			0.6	11.4	24.1	
Salsiccia, secca di Basilicata	60	2 oz.	0.5	12.4	26.5	300
			0.8	20.7	44.2	
Salsify (vegetable oyster)	100	2, 6″ long	15.5	3.5	1.0	85
			15.5	3.5	1.0	
Salsify, cooked	80	⅓ c.	7.2	0.9	Trace	35
			9.0	1.2	0.1	
Samp, coarse hominy	50	¼ c.	39.7	4.2	0.3	185
			79.4	8.3	0.5	
Sandwich spread, Heinz	20	1 T.	3.4	—	7.4	80
			17.0	0.3	36.8	
Sap Sago cheese	5	1 t. grated		2.1	0.1	10
				41.7	2.0	
Sapodilla, Cuban	200	1 av.	22.0	1.0	—	95
			*11.0	0.5	—	
Sapodilla, Florida	200	1 av.	16.8	0.6	2.0	50
			*8.4	0.3	1.0	
Sardine-tomato paste	6	1 t.	0.5	1.1	0.6	12
			*7.9	19.0	9.5	
Sardines in mustard or *Souse* sauce	100		2.2	20.0	11.8	200
			2.2	20.0	11.8	
Sardines in oil (American)	50	4, 2½″ long		9.6	12.8	160
				19.2	25.5	
Sardines in oil (French)	75	3, 3¼″ long		18.6	9.5	165
				24.8	12.7	
Sardines in tomato sauce (American)	95	1, 5″ long		17.2	5.3	120
				18.1	5.6	
Sauces:						
Chili, com.	20	1 T.	5.2	0.5	0.2	25
			26.0	2.5	0.8	
Cranberry	100	⅓ c.	44.6	0.2	0.3	185
			44.6	0.2	0.3	
Hollandaise	40	2 T.	—	1.0	17.5	165
			—	2.5	43.8	
Soy (Toyo), Philippine	10	2 t.	1.2	0.5	0.2	9
			*12.0	4.5	1.5	
Soy bean, Hawaiian	10	2 t.	0.5	0.8	—	5
			5.0	7.8	—	
Worcestershire, Lea & Perrins	5	1 t.	1.0	Trace	—	4
			19.0	1.1	Trace	
Sauerkraut, raw	80	½ c.	3.0	1.4	0.4	20
			3.8	1.7	0.5	
Sauerkraut, cooked	100	⅔ c.	3.5	1.5	0.4	25
			3.5	1.5	0.4	
Sauerkraut, canned	100	⅔ c.	3.4	1.1	0.2	20
			3.4	1.1	0.2	
Sauerkraut juice	120	½ c.	0.8	—	—	3
			0.7	—	—	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
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S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Sausages:						
Arles	115	¼ lb.		**30.8**	**58.2**	**700**
				26.8	50.6	
Beef, fried	60	2 oz.	**9.4**	**8.3**	**11.0**	**175**
			*15.7	13.8	18.4	
Black	60	2 oz.	**8.8**	**3.2**	**13.5**	**175**
			*14.7	5.3	22.5	
Blood	60	2 oz.		**8.9**	**20.8**	**230**
				14.8	34.6	
Bockwurst	60	2 oz.	**0**	**7.0**	**13.1**	**150**
			0	11.7	21.8	
Bologna	75	6 sl.	**0.2**	**14.0**	**13.2**	**180**
			0.3	18.7	17.6	
Bologna, all meat	75	6 sl.		**10.8**	**13.3**	**170**
				14.4	17.8	
Bologna, added cereal	75	6 sl.	**2.7**	**11.1**	**11.9**	**165**
			3.6	14.8	15.9	
Braunschweiger	60	2 oz.	**0**	**9.2**	**14.3**	**170**
			0	15.4	23.8	
Breakfast	60	2 oz.	**10.1**	**5.2**	**12.2**	**175**
			*16.8	8.7	20.4	
Country style	115	¼ lb.		**18.6**	**31.5**	**370**
				16.2	27.4	
Deerfoot Farm, cooked	115	¼ lb.	**—**	**22.9**	**62.3**	**670**
			Trace	19.9	54.2	
Farmer	115	¼ lb		**33.4**	**48.3**	**585**
				29.0	42.0	
Frankfort (Frankfurter)	120	2, 7" x ¾"	**1.3**	**23.5**	**22.3**	**310**
			1.1	19.6	18.6	
Frankfurter, all meat	120	2, 7" x ¾"		**16.9**	**25.0**	**300**
				14.1	20.8	
Frankfurter, added cereal	120	2, 7" x ¾"	**18.2**	**16.9**	**4.0**	**180**
			15.2	14.1	3.3	
Head cheese	115	¼ lb.		**17.2**	**23.3**	**285**
				15.0	20.3	
Italian:						
Capicollo	60	2 oz.	**0.8**	**12.5**	**24.1**	**280**
			1.4	20.8	40.2	
Cervellata fresca	60	2 oz.	**0.3**	**6.0**	**20.6**	**215**
			0.5	10.1	34.4	
Salsiccia, fresca di Napoli	60	2 oz.	**0.4**	**6.8**	**14.5**	**165**
			0.6	11.4	24.1	
Salsiccia secca di Basilicata	60	2 oz.	**0.5**	**12.4**	**26.5**	**300**
			0.8	20.7	44.2	
Liver	60	2 oz.	**0.9**	**10.0**	**12.4**	**195**
			1.5	16.7	20.6	
Polish style	60	2 oz.	**0**	**9.8**	**13.9**	**130**
			0	16.4	23.1	
Pork	35	2, 3½" long	**0.4**	**4.6**	**15.5**	**165**
			1.1	13.0	44.2	
Pork, fried	60	2 oz.	**7.6**	**6.9**	**14.9**	**200**
			*12.7	11.5	24.8	
Pork and beef	60	⅛ lb.		**11.6**	**14.5**	**180**
				19.4	24.1	
Salami	60	2 oz.		**14.3**	**22.1**	**265**
				23.9	36.8	
Souse	60	2 oz.	**0**	**7.9**	**7.4**	**100**
			0	13.2	12.3	
Summer	60	⅛ lb.		**15.6**	**26.7**	**310**
				26.0	44.5	
Savoy cabbage	120	1 c.	**7.2**	**4.0**	**0.8**	**55**
			6.0	3.3	0.7	
Savoy cabbage, boiled	100	½ c.	**1.1**	**1.3**	**—**	**10**
			*1.1	1.3	—	

S

Food items.	Size of portion.		Value of portion.			
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Sbrinz cheese	30	1 oz.	**0.4**	**10.2**	**8.6**	**125**
			*1.3	34.0	28.6	
Scallions, bulbs	12	4 sm.	**2.1**	**0.1**	Trace	**9**
			17.3	1.2	0.2	
Scallops, sm.	100	10 (½ c.)	**3.4**	**14.8**	**0.1**	**75**
			3.4	14.8	0.1	
Scallops, med.	175	10 (¾ c.)	**5.9**	**25.9**	**0.2**	**130**
			3.4	14.8	0.1	
Scallops, lg.	220	6 (1 c.)	**7.4**	**32.5**	**0.2**	**165**
			3.4	14.8	0.1	
Scallops, steamed	100	½ c.	**—**	**22.4**	**1.4**	**105**
			Trace	22.4	1.4	
Scamorzza, Italian cheese	30	1 oz.	**0.5**	**8.0**	**7.7**	**105**
			*1.8	26.6	25.8	
Schmierkäse	50	¼ c.		**14.0**	**4.5**	**100**
				28.0	9.0	
Scones (with egg)	100	1	**59.5**	**9.2**	**10.5**	**380**
			*59.5	9.2	10.5	
Scones (without egg)	100	1	**57.1**	**8.4**	**13.2**	**390**
			*57.1	8.4	13.2	
Scotch broth, canned	240	1 c.	**8.9**	**4.8**	**13.2**	**180**
			3.7	2.0	5.5	
Screw bean (Mesquite), dried	100		**77.1**	**12.2**	**2.5**	**390**
			77.1	12.2	2.5	
Scup	230	½ lb.		**43.7**	**11.5**	**285**
				19.0	5.0	
Sea-kale (sea-cabbage)	100	1½ c.	**3.8**	**1.4**	**0.4**	**25**
			3.8	1.4	0.4	
Sea-kale, cooked	100	½ c.	**0.3**	**0.4**	**0.1**	**4**
			*0.3	0.4	0.1	
Sea-trout	230	½ lb.		**43.7**	**4.6**	**220**
				19.0	2.0	
Sea-perch	230	½ lb.	**1.4**	**41.2**	**1.6**	**190**
			0.6	17.9	0.7	
Semolina	20	2 T.	**15.5**	**2.3**	**0.4**	**75**
			*77.5	11.7	1.8	
Semolina pudding (milk)	100		**5.5**	**1.2**	**1.1**	**40**
			*5.5	1.2	1.1	
Sesame seeds, black	100		**8.9**	**19.7**	**45.4**	**540**
			8.9	19.7	45.4	
Shad	230	½ lb.		**43.2**	**21.9**	**380**
				18.8	9.5	
Shad roe	140	½ lg.	**3.6**	**29.3**	**5.3**	**185**
			2.6	20.9	3.8	
Shallots, bulbs	12	4 sm.	**2.1**	**0.1**	Trace	**9**
			17.3	1.2	0.2	
Shepherd's pie	230	½ lb.	**28.1**	**16.3**	**12.4**	**295**
			*12.2	7.1	5.4	
Sherbet	60	2 oz.	**15.0**	**1.2**	**1.8**	**85**
			*25.0	2.0	3.0	
Shortbread	25	1 sq.	**16.4**	**1.4**	**5.7**	**125**
			65.6	5.8	23.0	
Shredded Ralston	30	½ c.	**23.2**	**2.6**	**0.3**	**110**
			74.0	8.5	1.0	
Shredded Wheat, N. B. C.	30	1 biscuit	**24.5**	**3.3**	**0.5**	**120**
			81.6	11.0	1.6	
Shrimps	65	8 med.	**1.1**	**12.5**	**0.3**	**60**
			1.7	19.3	0.4	
Shrimps, boiled	65	6 med.		**14.1**	**0.5**	**60**
				21.7	0.8	
Shrimps, canned (dry pack)	65	8 med.		**16.6**	**0.5**	**75**
				25.5	0.8	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

S

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Shrimps, canned (wet pack)	65	6 med.		**13.0**	**0.3**	**55**
				20.0	0.5	
Shrimp paste	6	1 t.	**0.1**	**1.1**	**0.7**	**11**
			*2.5	18.3	11.5	
Shrimp soup, cream of, canned	240	1 c.	**11.5**	**3.8**	**5.0**	**110**
			4.8	1.6	2.1	
"Single" cream, see 20% Cream, p. 102.						
Skate, fried	115	¼ lb.	**8.6**	**17.2**	**18.9**	**285**
			*7.5	15.0	16.4	
Smelts	120	3, 5¼″ long		**21.1**	**2.2**	**105**
				17.6	1.8	
Smelts, fried	100	3	**5.0**	**25.0**	**30.8**	**410**
			*5.0	25.0	30.8	
Snails, boiled	30	6 lg.		**3.3**	**0.5**	**20**
				11.0	1.6	
Snapbeans	75	¾ c.	**5.8**	**1.8**	**0.2**	**35**
			7.7	2.4	0.2	
Sole, American, is usually fillet of flounder.						
Sole, European	230	½ lb.	**2.1**	**36.6**	**3.9**	**195**
			0.9	15.9	1.7	
Sole, European, fried	115	¼ lb.	**6.2**	**23.1**	**21.2**	**315**
			*5.4	20.1	18.4	
Sole, European, steamed	115	¼ lb.		**20.2**	**1.5**	**95**
				17.6	1.3	
Sorghum syrup	20	1 T.	**12.7**		**—**	**50**
			*63.3		—	
Sorgo	160	½ c.	**100.8**	**3.8**	**—**	**430**
			*63.0	2.4	—	
Sorrel or dock	25	½ c.	Trace	**0.5**	Trace	**2**
			*0.1	2.1	0.2	
Soups and Broths, canned:						
Asparagus, Campbell, A.P.	140	½ c.	**9.8**	**1.8**	**1.7**	**65**
			7.0	1.3	1.2	
Asparagus, cream of, Heinz	240	1 c.	**9.1**	**1.9**	**7.9**	**120**
			3.8	0.8	3.3	
Asparagus, cream of, Heinz	120	½ c.	**7.8**	**3.0**	**5.9**	**100**
			6.5	2.5	4.9	
Bean, Campbell, A.P.	140	½ c.	**19.6**	**8.5**	**2.5**	**140**
			14.0	6.1	1.8	
Bean with smoked pork, Heinz	120	½ c.	**21.0**	**8.3**	**3.5**	**150**
			17.5	6.9	2.9	
Beef, Campbell, A.P.	120	½ c.	**9.8**	**6.7**	**1.6**	**85**
			8.2	5.6	1.3	
Beef noodle, Heinz	120	½ c.	**7.2**	**5.9**	**4.3**	**95**
			6.0	4.9	3.5	
Beef with vegetables, Heinz	120	½ c.	**12.2**	**5.6**	**3.1**	**100**
			10.2	4.7	2.6	
Beefstock, vegetable, Heinz	120	½ c.	**17.0**	**3.5**	**1.1**	**95**
			14.2	2.9	0.9	
Bouillon, beef	240	1 c.	**0.7**	**6.2**	**0.2**	**30**
			0.3	2.6	0.1	
Bouillon, Campbell, A.P.	120	½ c.	**0.1**	**4.7**	**—**	**20**
			0.1	3.9	—	
Celery	230	1 c.	**11.5**	**4.8**	**6.4**	**125**
			5.0	2.1	2.8	
Celery, Campbell, A.P.	140	½ c.	**9.5**	**2.0**	**2.2**	**70**
			6.8	1.4	1.6	
Celery, cream of, Crosse & Blackwell	240	1 c.	**11.5**	**4.1**	**5.3**	**115**
			4.8	1.7	2.2	

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Soups and Broths, canned:						
Chicken, Campbell, A.P.	120	½ c.	**3.1**	**4.3**	**1.4**	45
			2.6	3.6	1.2	
Chicken gumbo, Campbell, A.P.	140	½ c.	**12.0**	**4.2**	**1.0**	75
			8.6	3.0	0.7	
Chicken noodle, Campbell, A.P.	120	½ c.	**8.0**	**4.7**	**1.8**	70
			6.7	3.9	1.5	
Chicken noodle, Heinz	120	½ c.	**8.0**	**3.2**	**2.6**	70
			6.7	2.7	2.2	
Clam chowder, Campbell, A.P.	140	½ c.	**13.6**	**4.2**	**5.7**	125
			9.7	3.0	4.1	
Clam chowder, Heinz	120	½ c.	**12.2**	**2.6**	**1.9**	80
			10.2	2.2	1.6	
Consommé, Campbell, A.P.	120	½ c.	**0.1**	**4.7**	**—**	20
			0.1	3.9	—	
Fish chowder, Clapp	28.4	1 oz.	**2.2**	**0.5**	**—**	11
			7.6	1.8	0.2	
Gumbo, Creole, Heinz	120	½ c.	**10.1**	**1.4**	**3.5**	80
			8.4	1.2	2.9	
Julienne, Campbell, A.P.	120	½ c.	**1.1**	**3.1**	**—**	15
			0.9	2.6	—	
Liver soup, Beech-Nut	28.4	1 oz.	**2.0**	**0.9**	**0.3**	14
			7.0	3.2	1.0	
Liver soup, Campbell	28.4	1 oz.	**2.1**	**1.0**	**0.3**	15
			7.5	3.4	0.9	
Liver soup, Clapp	28.4	1 oz.	**1.6**	**1.5**	**0.2**	14
			5.6	5.3	0.7	
Liver soup, Gerber	28.4	1 oz.	**1.8**	**1.1**	**0.2**	13
			6.5	3.8	0.7	
Liver soup, Libby	28.4	1 oz.	**2.2**	**1.1**	**—**	14
			7.8	3.9	0.2	
Liver and beef soup, Heinz	28.4	1 oz.	**1.8**	**1.2**	**0.6**	18
			6.5	4.4	2.3	
Mock turtle, Campbell, A.P.	130	½ c.	**7.8**	**7.5**	**1.0**	75
			6.0	5.8	0.8	
Mulligatawny, Campbell, A.P.	150	½ c.	**16.1**	**4.1**	**0.8**	90
			10.7	2.7	0.5	
Mushroom broth	120	½ c.	**—**	**—**	**0.2**	2
			1.2	1.1	0.2	
Mushroom, cream of, Campbell, A.P.	140	½ c.	**13.2**	**5.0**	**8.5**	155
			9.4	3.6	6.1	
Mushroom, cream of, Crosse & Blackwell	240	1 c.	**11.5**	**4.6**	**5.3**	115
			4.8	1.9	2.2	
Mushroom, cream of, Heinz	120	½ c.	**11.0**	**4.2**	**6.2**	120
			9.2	3.5	5.2	
Mutton, Campbell, A.P.	150	½ c.	**6.9**	**6.4**	**0.8**	60
			4.9	4.6	0.6	
Onion, cream of, Crosse & Blackwell	240	1 c.	**11.3**	**4.1**	**5.0**	110
			4.7	1.7	2.1	
Oxtail, Campbell	140	½ c.	**11.9**	**5.5**	**2.4**	95
			8.5	3.9	1.7	
Oyster, cream of, Crosse & Blackwell	240	1 c.	**10.3**	**3.6**	**5.5**	110
			4.3	1.5	2.3	

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Soups and Broths, canned:						
Pea, Campbell, A.P.	140	½ c.	**17.4**	**6.7**	**2.2**	**120**
			12.4	4.8	1.6	
Pea, Heinz	120	½ c.	**11.5**	**3.5**	**2.4**	**85**
			9.6	2.9	2.0	
Pepper-pot, Campbell, A.P.	140	½ c.	**11.5**	**6.4**	**4.2**	**115**
			8.2	4.6	3.0	
Pepper-pot, Heinz	120	½ c.	**10.8**	**4.8**	**3.7**	**100**
			9.0	4.0	3.1	
Printanier, Campbell, A.P.	140	½ c.	**1.4**	**8.5**	**—**	**40**
			1.0	6.1	—	
Scotch broth, Heinz	120	½ c.	**11.0**	**4.9**	**5.2**	**115**
			9.2	4.1	4.3	
Shrimp, cream of, Crosse & Blackwell	240	1 c.	**11.5**	**3.8**	**5.0**	**110**
			4.8	1.6	2.1	
Spinach, cream of, Crosse & Blackwell	240	1 c.	**11.5**	**4.3**	**5.0**	**110**
			4.8	1.8	2.1	
Tomato, Campbell, A.P.	140	½ c.	**13.4**	**2.2**	**2.0**	**80**
			8.9	1.6	1.4	
Tomato, Heinz	240	1 c.	**16.3**	**2.0**	**1.8**	**90**
			13.6	1.7	1.5	
Vegetable, Campbell, A.P.	140	½ c.	**17.4**	**5.2**	**2.0**	**110**
			12.4	3.7	1.4	
Vegetable beef, Campbell, A.P.	140	½ c.	**7.8**	**11.1**	**2.9**	**105**
			5.6	7.9	2.1	
Vegetarian vegetable, Heinz	120	½ c.	**19.2**	**3.5**	**0.5**	**100**
			16.0	2.9	0.4	
Soups, dried ingredients:						
Betty Crocker pea soup	113	1 pkg.	**68.7**	**26.4**	**1.7**	**395**
			60.6	23.3	1.5	
Betty Crocker vegetable noodle soup (meat flavor)	64	1 pkg.	**37.3**	**6.4**	**1.7**	**190**
			58.5	10.1	2.6	
Soursop, "sour apple," West Indies	115	⅕ av.	**19.7**	**0.9**	**0.1**	**85**
			17.2	0.8	0.1	
Souse	60	2 oz.	**0**	**7.9**	**7.4**	**100**
			0	13.2	12.3	
Soy beans:						
Green	75	½ c.	**9.9**	**10.2**	**4.9**	**130**
			13.2	13.6	6.3	
Green, cooked	125	½ c.	**17.2**	**18.2**	**4.4**	**195**
			13.8	14.4	3.5	
Baked	100	½ c.	**16.5**	**15.1**	**7.6**	**200**
			16.5	15.1	7.6	
Fermented	100		**3.1**	**18.7**	**9.4**	**175**
			3.1	18.7	9.4	
Ripe, canned	250	1 c.	**10.0**	**50.0**	**32.6**	**550**
			4.0	20.0	13.0	
Dried	100	½ c.	**33.1**	**30.2**	**15.3**	**400**
			33.1	30.2	15.3	
Soy Bean:						
Curd (Tofu)	100		**1.6**	**9.0**	**4.1**	**80**
			1.6	9.0	4.1	
Flour	100	1¼ c. sc.	**8.0**	**45.0**	**11.0**	**320**
			8.0	45.0	11.0	
Meal	100	1¼ c. sc.	**8.2**	**38.3**	**14.9**	**325**
			*8.2	38.3	14.9	
Milk	100		**0.6**	**3.5**	**2.4**	**40**
			0.6	3.5	2.4	

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
Soy bean:						
Sauce, Hawaiian	10	2 t.	**0.5**	**0.8**	**—**	5
			5.0	7.8	—	
Sauce (Toyo), Philippines	10	2 t.	**1.2**	**0.5**	**0.2**	9
			*12.0	4.5	1.5	
Sprouts	65	½ c.	**4.1**	**5.5**	**1.2**	50
			6.3	8.5	1.8	
Spanish melon	200	½ med.	**10.0**	**1.2**	**—**	45
			*5.0	0.6	—	
Spaghetti	100	¾ c.	**75.9**	**12.1**	**0.4**	365
			75.9	12.1	0.4	
Spaghetti in tomato sauce, Heinz	240	1 c.	**35.5**	**5.0**	**0.7**	170
			14.8	2.1	0.3	
Spinach	75	1½ c.	**1.7**	**1.6**	**0.2**	15
			*2.3	2.1	0.3	
Spinach, cooked	100	½ c.	**0.8**	**2.0**	**0.2**	13
			*0.8	2.0	0.2	
Spinach, canned	225	1 c.	**5.4**	**5.4**	**0.7**	50
			2.4	2.4	0.3	
Spinach, New Zealand	75	1½ c.	**3.1**	**1.7**	**0.2**	20
			4.1	2.2	0.2	
Spinach soup, cream of, canned	240	1 c.	**13.4**	**4.6**	**15.2**	215
			5.6	1.9	5.9	
Spleen, fresh:						
Beef and veal	115	¼ lb.		**20.8**	**3.5**	120
				18.1	3.0	
Hog	115	¼ lb.		**19.7**	**4.4**	120
				17.1	3.8	
Sheep	115	¼ lb.		**21.6**	**4.5**	130
				18.8	3.9	
Sponge cake	50	1 sq.	**26.7**	**4.7**	**3.5**	160
			*53.5	9.5	7.0	
Sprats	230	½ lb.		**39.3**	**33.3**	470
				17.1	14.5	
Sprats, fresh, fried	60	2 oz.		**13.4**	**22.7**	265
				22.3	37.9	
Sprats, smoked, grilled	60	2 oz.		**15.1**	**13.9**	190
				25.1	23.2	
Spring greens, boiled	100	½ c.	**0.9**	**1.7**	**—**	10
			*0.9	1.7	—	
Squab (pigeon)	50	1 whole		**9.3**	**11.0**	140
				18.6	22.1	
Squab, with skin, cooked	50	1 whole		**9.5**	**11.0**	140
				19.0	22.0	
Squash:						
Cushaw	125	1 c.	**9.1**	**1.5**	**0.4**	45
			7.3	1.2	0.3	
Summer, white	250	1¾ c. diced	**9.8**	**1.5**	**0.3**	50
			3.9	0.6	0.1	
Summer, boiled	100	¾ c.	**3.5**	**0.5**	**—**	15
			3.5	0.5	Trace	
Winter	250	1¾ c. diced	**22.0**	**3.8**	**0.8**	115
			8.8	1.5	0.3	
Winter, boiled	100	¾ c.	**4.0**	**1.0**	**0.3**	25
			*4.0	1.0	0.3	
Canned	125	½ c.	**13.1**	**1.1**	**0.6**	65
			10.5	0.9	0.5	
Squeteague (sea-trout)	230	½ lb.		**43.7**	**4.6**	220
				19.0	2.0	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Stachys, raw	50	6 med.	**8.3**	**1.3**	**—**	**40**
			*16.6	2.7	Trace	
Steak and kidney pie	115	¼ lb.	**19.2**	**17.7**	**21.7**	**355**
			*16.7	15.4	18.9	
Stilton cheese	25	1½″ × 1½″ × 1¼″	**—**	**7.3**	**7.8**	**105**
			—	29.0	31.2	
St. John's bread (carob bean)	10	4″ piece	**6.7**	**0.6**	**0.1**	**30**
			67.0	5.7	1.1	
Strained foods, see page 141.						
Strawberries:						
Fresh	100	¾ c.	**6.0**	**1.0**	**0.6**	**35**
			*6.0	1.0	0.6	
Stewed	120	⅔ c.	**28.8**	**0.8**	**—**	**120**
			24.0	0.7	—	
Canned, water pack	120	⅔ c.	**7.0**	**0.7**	**0.5**	**35**
			5.8	0.6	0.4	
Canned, juice pack	120	⅔ c	**9.6**	**1.0**	**1.0**	**50**
			8.0	0.8	0.8	
Canned, in syrup	120	⅔ c.	**33.6**	**0.6**	**0.2**	**125**
			28.0	0.5	0.2	
Strawberry extract, Burnett, A.P.	6	1 t.	**2.8**	**0**	**0**	**12**
			47.0	0	0	
Strawberry jam, com.	25	1 T.	**17.1**	**0.1**	**—**	**70**
			*68.5	0.5	Trace	
Strawberry juice	120	½ c.	**6.1**	**0.2**	**—**	**25**
			5.1	0.2	—	
String beans	75	¾ c.	**5.8**	**1.8**	**0.2**	**35**
			7.7	2.4	0.2	
String beans, cooked	130	⅔ c.	**4.5**	**1.3**	**0.1**	**25**
			3.5	1.0	0.1	
String beans, boiled in much water	130	⅔ c.	**2.5**	**1.0**	**0.1**	**15**
			1.9	0.8	0.1	
String beans, canned	130	⅔ c.	**4.9**	**1.4**	**0.1**	**25**
			3.8	1.1	0.1	
Sturgeon	230	½ lb.		**35.4**	**3.7**	**180**
				15.4	1.6	
Sturgeon, steamed	115	¼ lb.		**28.4**	**6.6**	**180**
				24.7	5.7	
Sturgeon caviar	15	2 t.	**1.1**	**4.5**	**3.0**	**50**
			7.6	30.0	19.7	
Succotash, canned	210	¾ c.	**37.1**	**7.5**	**2.1**	**200**
			*17.7	3.6	1.0	
Suet, beef	10	1 T		**0.5**	**8.2**	**80**
				4.7	81.8	
Suet pudding	100		**36.6**	**4.3**	**18.1**	**335**
			*36.6	4.3	18.1	
Suet pudding with raisins	100		**40.8**	**3.8**	**15.6**	**330**
			*40.8	3.8	15.6	
Sugars:						
Cane, brown	10	1 T.	**9.1**	**—**	**—**	**35**
			*91.0	—	—	
Demerara	10	1 T.	**9.9**	**—**	**—**	**40**
			*99.3	0.5	—	
Cane, granulated	105	½ c.	**104.9**	**—**	**—**	**430**
			*99.9	—	—	
Cane, granulated	13	1 T.	**13.0**	**—**	**—**	**50**
			*99.9	—	—	
Cane, coarse, powdered	90	½ c.	**89.9**	**—**	**—**	**370**
			*99.9	—	—	
Corn, anhydrous	10	1 T.	**10.0**	**—**	**—**	**40**
			*?100.0	—	—	

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Sugars:						
Crystal squares, Domino	3	1	2.8 *99.9	— —	— —	12
Crystal tablets, Domino	5	1	4.9 *99.9	— —	— —	20
Granulated	105	½ c.	104.9 *99.9	— —	— —	425
Granulated	5	1 t.	5.0 *99.9	— —	— —	20
Maple	60	1, 1½" sq.	49.7 *82.8	— —	— —	205
Old fashioned brown, Domino	10	1 T.	9.3 *92.8	0 0	0 0	40
Tablet	5	1 tablet	5.0 *?100.0	— —	— —	20
Surinam-cherry	30	10	6.7 22.3	0.3 1.0	— 0.1	30
Swedes	120	¾ c.	5.2 *4.3	1.7 1.4	— —	30
Swedes, boiled	120	½ c.	4.6 *3.8	1.1 0.9	— —	25
Sweetbreads:[1]						
Beef	115	¼ lb.		19.3 16.8	13.9 12.1	210
Beef, med. fat	115	¼ lb.		16.5 13.5	28.7 25.0	335
Beef, boiled‡	80	2		17.8 22.2	6.8 8.6	135
Beef, broiled‡	115	3		29.6 25.7	10.5 9.9	220
Beef, canned	115	¼ lb.		23.2 20.2	10.5 9.1	195
Hog	115	¼ lb.		16.7 14.5	27.4 23.8	325
Veal	115	¼ lb.		22.1 19.2	10.1 8.8	185
Stewed	60	2 oz.		13.6 22.7	5.5 9.1	105
Sweet potatoes	150	1, 6" x 1¾"	39.2 *26.1	2.7 1.8	1.1 0.7	180
Sweet potatoes, baked	100	½ lg.	32.2 32.2	2.1 2.1	0.8 0.8	150
Sweet potatoes, boiled	100	1 med.	20.1 *20.1	1.1 1.1	0.5 0.5	90
Sweet potatoes, canned	75	2 sm.	31.1 41.4	1.4 1.9	0.3 0.4	135
Sweetpotato tops	100		6.3 6.3	2.3 2.3	0.3 0.3	40
Swift's meats for babies, see pages 144, 147.						
Swiss chard, leaves only	100	1½ c.	4.8 4.8	2.6 2.6	0.4 0.4	35
Swiss chard, leaves and stalks	100	1 c.	4.4 4.4	1.4 1.4	0.2 0.2	25
Swiss chard, stalks only	125	1 c.	3.6 2.9	1.3 1.0	0.1 0.1	20
Swiss chard, cooked	100	⅔ c.	3.0 3.0	2.4 2.4	0.2 0.2	25
Swiss cheese	30	2 cu. in.	0.4 *1.3	8.3 27.6	10.4 34.9	130

[1] Generally thyroid gland.
* Largely assimilable.
Blank space indicates lack of data.
‡ Gross fat removed.
Negligible quantity is designated by —.

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Swiss cheese, Kraft	30	⅛ in. 5# loaf		7.9	7.8	105
				26.5	26.0	
Swiss-Swedish cheese	30	2 cu. in.	1.8	6.9	10.9	135
			*6.1	23.2	36.4	
Swiss-Russian cheese	30	2″ x 1″ x 1″	1.3	7.4	9.6	125
			*4.4	24.9	32.3	
Swordfish, fresh	230	½ lb.		43.0	7.1	240
				18.7	3.1	
Syrups:						
Corn and cane	160	½ c.	118.7	0.4	—	490
			*74.2	0.2	—	
Domino	160	½ c.	115.2	0	0	470
			*72.0	0	0	
English golden	20	1 T.	15.8	—	—	65
			*79.0	0.3	—	
Karo, Blue Label	20	1 T.	14.8	0	0	60
			*74.0	0	0	
Karo, Green Label	160	½ c.	120.0	0	0	490
			*75.0	0	0	
Karo, Green Label	20	1 T.	15.0	0	0	60
			*75.0	0	0	
Karo, Red Label	160	½ c.	120.0	0	0	490
			*75.0	0	0	
Log Cabin	18	1 T.	11.9	0	0	50
			*66.0	0	0	
Maple	18	1 T.	1.28	—	—	50
			*71.4	—	—	
Sorghum	20	1 T.	12.7		—	50
			*63.3		—	
Sorgo	160	½ c.	100.8	3.8	—	430
			*63.0	2.4	—	
Sugar cane	160	½ c	110.6	0.8	—	450
			*69.1	0.4	—	

T

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Tabasco Sauce			0	0	0	0
			0	0	0	
Tangerines, Mandarin orange	100	2, 2″ diam.	8.0	0.9	—	35
			*8.0	0.9	—	
Tamarind, Florida	5	1 lg.	3.9	0.5	0.3	20
			*29.4	2.7	1.3	
Tangelo juice	120	½ c.	10.8	0.8	—	50
			9.0	0.7	—	
Tangerine juice	120	½ c.	10.0	1.1	0.4	50
			9.2	0.9	0.3	
Tapioca	40	¼ c.	35.2	0.2	Trace	145
			88.0	0.4	0.1	
Tapioca, Minute	40	¼ c.	35.2	0.2	Trace	145
			88.0	0.4	0.1	
Tapioca pudding	100		20.8	3.2	3.8	135
			*20.8	3.2	3.8	
Taro, leaves and stems	100		5.8	2.7	0.7	40
			*5.8	2.7	0.7	
Taro, shoots	100		2.2	0.9	0.1	14
			2.2	0.9	0.1	
Taro, tuber	150	1 med.	33.6	2.7	0.3	150
			*22.4	1.8	0.2	
Taro, steamed	100		26.4	1.2	0.2	115
			*26.4	1.2	0.2	
Tea, black leaves	2.3	1 ball[1]	—	0.4	—	1
			*1.7	16.0	Trace	
Tea infusion	140	1 teacup	—	—	—	—
			Trace	0.1	Trace	

[1] Contents of 1 standard tea ball, 2.3 grams.

T

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Terrapin	115	¼ lb.		**24.4**	**4.0**	**135**
				21.2	3.5	
Thousand Island dressing, com.	15	1 T.	**2.6**	**0.1**	**5.9**	**65**
			17.3	0.8	39.0	
Toasts:						
Graham bread	20	1 sl.	**13.0**	**2.2**	**0.5**	**65**
			65.0	11.0	2.5	
Melba, white bread	20	2 sl., 4″ sq.	**15.8**	**2.8**	**0.4**	**80**
			79.0	14.0	1.8	
Rye bread	18	1 sl.	**13.3**	**2.3**	**0.2**	**65**
			73.9	12.8	1.1	
White bread	15	1 sl.	**10.7**	**1.9**	**0.3**	**55**
			71.1	13.3	2.2	
Toffee, home-made	10	1 sq.	**8.8**	**—**	**0.6**	**40**
			*87.8	0.2	6.2	
Tomatoes:						
Fresh, ripe	125	1 small	**4.1**	**1.1**	**0.5**	**25**
			*3.3	0.9	0.4	
Fried	100		**3.3**	**1.0**	**5.9**	**70**
			*3.3	1.0	5.9	
Green or unripe	125	1, 2¼″ diam.	**4.1**	**1.5**	**0.3**	**25**
			3.3	1.2	0.2	
Cooked	130	½ c.	**5.2**	**1.3**	**0.3**	**30**
			4.0	1.0	0.2	
Canned	130	½ c.	**4.5**	**1.6**	**0.3**	**25**
			*3.5	1.2	0.2	
Dried	100		**62.3**	**12.9**	**8.1**	**385**
			62.3	12.9	8.1	
Tomato:						
Bouillon, canned	240	1 c.	**1.0**	**2.6**	**0.7**	**20**
			0.4	1.1	0.3	
Catsup	20	1 T.	**4.8**	**0.4**	**0.2**	**25**
			24.0	2.0	1.0	
Juice, canned	120	½ c.	**4.3**	**1.2**	**0.1**	**25**
			3.6	1.0	0.1	
Juice cocktail	60	¼ c.	**2.1**	**1.1**	**—**	**13**
			*3.6	0.9	0.1	
Ketchup, com.	20	1 T.	**5.0**	**0.5**	**0.2**	**25**
			25.0	2.5	0.8	
Paste, canned	15	1 T.	**2.8**	**0.7**	**0.2**	**16**
			18.7	4.7	1.4	
Pomace	100			**24.0**	**4.0**	**135**
				24.0	4.0	
Sauce, canned	15	1 T.	**1.4**	**0.1**	**0.1**	**5**
			9.0	0.4	0.3	
Soup, canned, conc.	140	½ c.	**13.4**	**2.2**	**2.0**	**80**
			8.9	1.6	1.4	
Soup, cream of, canned	240	1 c.	**21.6**	**2.9**	**5.7**	**155**
			9.0	1.2	2.4	
Tomcod, whole	230	½ lb.		**39.6**	**0.9**	**170**
				17.2	0.2	
Tongue, fresh:						
Beef, lean	115	¼ lb.	**0.5**	**20.0**	**12.7**	**200**
			0.4	17.4	11.0	
Beef, medium	115	¼ lb.	**0.5**	**18.9**	**17.3**	**240**
			0.4	16.4	15.0	
Beef, fat	115	¼ lb.	**0.5**	**17.9**	**20.7**	**270**
			0.4	15.7	18.0	
Beef, very fat	115	¼ lb.	**0.5**	**16.6**	**26.5**	**315**
			0.4	14.4	23.0	
Calf	115	¼ lb.	**1.0**	**21.3**	**6.1**	**150**
			0.9	18.5	5.3	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Tongue, fresh:						
Lamb	115	¼ lb.	**0.6**	**16.0**	**17.6**	**230**
			0.5	13.9	15.3	
Sheep	115	¼ lb.	**2.8**	**15.8**	**25.1**	**310**
			2.4	13.7	21.8	
Pork	115	¼ lb.	**0.6**	**19.3**	**17.9**	**250**
			0.5	16.8	15.6	
Tongue, cooked:						
Anterior, boiled‡	115	¼ lb.		**25.1**	**17.6**	**265**
				21.8	15.3	
Posterior, boiled‡	115	¼ lb.		**24.1**	**29.3**	**370**
				21.0	25.5	
Beef, canned	50	3 sl.		**9.7**	**16.6**	**205**
				19.5	23.2	
Beef, pickled	60	2 oz.		**7.7**	**12.3**	**145**
				12.8	20.5	
Ox, pickled	60	2 oz.	**1.4**	**11.5**	**14.3**	**185**
			*2.3	19.1	23.9	
Potted or deviled	6	1 t.	—	**1.1**	**1.4**	**18**
			0.7	18.6	23.0	
Sheep, stewed	115	¼ lb.		**20.7**	**27.6**	**340**
				18.0	24.0	
Trappist cheese	25	1½" x 1" x ¾"		**5.3**	**6.3**	**80**
				21.2	25.2	
Treacle, black	25	1 T.	**16.8**	**0.3**	**0**	**10**
			*67.2	1.2	0	
Tripe, stewed	115	¼ lb.		**20.7**	**3.4**	**115**
				18.0	3.0	
Tripe, beef, canned	115	¼ lb.		**19.3**	**9.8**	**170**
				16.8	8.5	
Tripe, pickled	115	¼ lb.	**0.2**	**13.5**	**1.4**	**70**
			0.2	11.7	1.2	
Triscuit, N. B. C.	10	2	**8.2**	**1.1**	**0.2**	**40**
			81.7	10.5	1.6	
Trout, brook	230	½ lb.		**44.2**	**4.8**	**235**
				19.2	2.1	
Trout, brook, cooked	115	¼ lb.	**1.3**	**24.3**	**2.7**	**130**
			1.2	21.2	2.4	
Trout, salmon or lake	230	½ lb.		**40.9**	**23.7**	**490**
				17.8	10.3	
Trout, steamed	115	¼ lb.		**25.6**	**5.2**	**155**
				22.3	4.5	
Trout, sea, steamed	115	¼ lb.		**24.3**	**5.5**	**150**
				21.1	4.8	
Truffles	100		—	—	**0.6**	**5**
			6.0	6.1	0.6	
Truffles, black	100		—	—	**0.5**	**5**
			7.6	8.7	0.5	
Truffles, white	100		—	—	**0.6**	**5**
			7.9	8.9	0.6	
Tuna (tunny fish)	230	½ lb.		**75.2**	**26.2**	**550**
				26.6	11.4	
Tuna in oil	90	½ c.		**22.9**	**17.6**	**260**
				25.4	19.6	
Turbot	230	½ lb.		**34.0**	**33.1**	**445**
				14.8	14.4	
Turbot, steamed	115	¼ lb.		**23.8**	**1.8**	**115**
				20.7	1.6	
Turkey	230	½ lb.		**48.5**	**52.7**	**690**
				21.1	22.9	
Turkey gizzard	100		**1.3**	**20.5**	**10.6**	**190**
			1.3	20.5	10.6	
Turkey heart	30	1 oz.	**0.1**	**4.9**	**3.8**	**55**
			0.2	16.2	12.7	

T

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
‡Turkey, breast, roasted . .	115	¼ lb.		36.5 31.8	2.6 2.3	175
‡Turkey, thigh and leg, roasted	115	¼ lb.		31.3 27.3	8.5 7.4	205
Turkey egg, see Eggs.						
Turnip cabbage (kohlrabi) .	100	½ c.	4.2 *4.2	2.0 2.0	0.1 0.1	25
Turnip salad greens	50	½ c.	3.2 6.3	2.1 4.2	0.3 0.6	25
Turnip tops	100	1 c.	5.4 5.4	2.9 2.9	0.4 0.4	35
Turnip tops, boiled . . .	100	½ c.	0.1 *0.1	2.7 2.7	— —	12
Turnips, white	120	¾ c. diced	8.2 *6.8	1.6 1.3	0.2 0.2	40
Turnips, yellow	120	¾ c. diced	7.3 *6.1	1.6 1.3	0.2 0.2	40
Turnips, yellow, boiled . .	125	½ c.	5.5 *4.4	1.1 0.9	0.1 0.1	30
Turnip-rooted celery (celeriac)	90	1 med.	7.9 8.8	1.3 1.7	0.3 0.3	40
Turnip-rooted parsley, roots .	100		9.2 9.2	2.1 2.1	0.2 0.2	50
Turtle, green	115	¼ lb.		22.7 19.8	0.6 0.5	100
Turtle, green, canned . . .	75	⅛ lb.		17.5 23.4	0.5 0.7	75
Turtle egg, see Eggs.						
Turtle soup, canned . . .	240	1 c.	8.2 3.4	2.6 1.1	1.0 0.4	55

U

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Udo, shoots	100		2.4 *2.4	1.0 1.0	0.2 0.2	15

V

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Vanilla extract, Burnett . .	5	1 t.	0.4 7.0	0 0	0 0	2
Veal, fresh:						
Brains	230	½ lb.		23.8 10.6	20.7 9.0	290
Breast, very lean	230	½ lb.		53.1 23.1	5.8 2.5	270
Breast, lean	230	½ lb.		48.8 21.2	18.4 8.0	370
Breast, all analyses . . .	230	½ lb.		46.7 20.3	25.3 11.0	425
Chops, med. fat	100	1 chop, ⅜″ thick		19.9 19.9	10.8 10.8	180
Chuck, lean	230	½ lb.		47.4 20.6	4.4 1.9	210
Chuck, all analyses . .	230	½ lb.		45.3 19.7	13.3 5.8	310
Cutlet	230	½ lb.		46.7 20.3	17.7 7.7	355
Flank	230	½ lb.		46.2 20.1	29.2 12.7	460

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

V

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Veal, fresh:						
Fore-quarter	230	½ lb.		**46.0**	**18.4**	**360**
				20.0	8.0	
Heart	115	¼ lb.		**19.3**	**11.0**	**180**
				16.8	9.6	
Kidneys	115	¼ lb.	**0.2**	**19.3**	**6.0**	**135**
			0.2	16.8	5.2	
Leg, lean	230	½ lb.		**49.0**	**9.4**	**290**
				21.3	4.1	
Leg, all analyses	230	½ lb.		**47.6**	**15.4**	**340**
				20.7	6.7	
Liver	230	½ lb.		**43.7**	**12.2**	**295**
				19.0	5.3	
Loin, lean	230	½ lb.		**46.9**	**12.9**	**310**
				20.4	5.6	
Loin, all analyses	230	½ lb.		**45.8**	**23.0**	**400**
				19.9	10.0	
Lungs	115	¼ lb.		**19.7**	**5.8**	**135**
				17.1	5.0	
Muscle	230	½ lb.	**3.5**	**40.9**	**36.7**	**510**
			1.5	17.8	16.0	
Neck	230	½ lb.		**46.7**	**15.9**	**340**
				20.3	6.9	
Rib, medium fat	230	½ lb.		**47.6**	**14.0**	**325**
				20.7	6.1	
Rib, all analyses	230	½ lb.		**46.5**	**21.6**	**390**
				20.2	9.4	
Rump	230	½ lb.		**45.5**	**37.2**	**535**
				19.8	16.2	
Shank, fore	230	½ lb.		**47.6**	**12.0**	**305**
				20.7	5.2	
Shank, hind, medium fat	230	½ lb.		**47.6**	**10.6**	**295**
				20.7	4.6	
Shoulder, lean	230	½ lb.		**47.6**	**10.6**	**295**
				20.7	4.6	
Side	230	½ lb.		**46.5**	**18.6**	**365**
				20.2	8.1	
Veal, cooked:						
Brains, boiled	115	¼ lb.		**13.8**	**6.7**	**120**
				12.0	5.8	
‡Cutlet, broiled	80	1 av.		**22.7**	**2.7**	**120**
				28.4	3.4	
Cutlet, fried	80	1 av.	**3.5**	**24.3**	**6.5**	**175**
			*4.4	30.4	8.1	
Cutlet, roasted	80	1 av.		**23.2**	**9.6**	**180**
				29.0	12.0	
‡Leg, roasted	115	¼ lb.		**33.4**	**0.8**	**145**
				29.1	0.7	
‡Liver, fried	115	¼ lb.		**27.6**	**9.8**	**205**
				24.0	8.5	
Roasted, cold	115	¼ lb.		**37.0**	**13.1**	**275**
				32.2	11.4	
Vegetable marrow	100	⅔ c.	**1.4**	**0.5**	**0.1**	**10**
			*1.4	0.5	0.1	
Vegetable marrow, cooked	100	⅔ c.	**0.2**	**0.1**	**—**	**1**
			*0.2	0.1	Trace	
Vegetable-oyster (salsify)	100	2, 6″ long	**15.5**	**3.5**	**1.0**	**85**
			15.5	3.5	1.0	
Vegetable-oyster, cooked	80	½ c.	**7.2**	**0.9**	Trace	**35**
			9.0	1.2	0.1	
Vegetable pear, see Chayote.						
Vegetable soup, canned, conc.	140	½ c.	**17.4**	**5.2**	**2.0**	**110**
			12.4	3.7	1.4	
Vegetable soup, canned	250	1 c.	**15.0**	**3.8**	**1.3**	**90**
			6.0	1.5	0.5	

V

Food items.	Size of portion.		Value of portion.			
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal
Vegetable soup, see also Soups, canned.						
Vegetables, mixed, canned .	80	⅓ c.	**2.5**	**1.1**	—	**15**
			*3.1	1.4	—	
Vegex (Marmite)	4	1 t.	**0**	**1.3**	**0.3**	**8**
			0	32.6	0.8	
Velveeta, Kraft	30	3, $\frac{3}{16}$″ sl. ½#	**1.8**	**5.4**	**7.5**	**100**
			*6.0	18.0	25.0	
Vendôme cheese	30	2 T.		**8.4**	**6.3**	**105**
				28.0	20.9	
Venison, fresh:						
Forequarter	230	½ lb.		**50.1**	**21.6**	**405**
				21.8	9.4	
Hindquarter	230	½ lb.		**44.6**	**44.2**	**595**
				19.4	19.2	
Lean meat only	230	½ lb.		**46.0**	**13.8**	**315**
				20.0	6.0	
Side	230	½ lb.		**47.2**	**33.1**	**500**
				20.5	14.4	
Venison, roasted	115	¼ lb.		**38.5**	**7.4**	**225**
				33.5	6.4	
Vermicelli, uncooked . . .	60	½ c.	**43.2**	**6.5**	**1.2**	**215**
			72.0	10.9	2.0	
Vinegars:						
Cider	5	1 t.	Trace	**0**	**0**	—
			0.8	0	0	
Malt	5	1 t.	Trace	**0**	**0**	—
			0.5	0	0	
Spiced, salad	5	1 t.	**0.5**	**0**	**0**	**2**
			10.0	0	0	
Tarragon	5	1 t.	Trace	**0**	**0**	—
			0.2	0	0	
Wine	5	1 t.	Trace	**0**	**0**	—
			0.4	0	0	
Vinespinach	75	1½ c.	**1.8**	**1.5**	**0.2**	**15**
			*2.4	2.0	0.3	

W

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal
Walnuts, black	35	6 (whole)	**3.5**	**9.7**	**19.7**	**235**
			*10.0	27.6	56.3	
Walnuts, California or English	35	6 (whole)	**1.8**	**4.4**	**18.0**	**195**
			*5.0	12.5	51.5	
Walnuts, soft-shell . . .	35	6 (whole)	**4.7**	**5.8**	**22.2**	**250**
			13.5	16.6	63.4	
Water chestnuts	100	10, 1¼″ diam.	**15.6**	**1.5**	**0.1**	**70**
			*15.6	1.5	0.1	
Water crackers	18	2	**12.9**	**1.9**	**1.6**	**75**
			71.9	10.7	8.8	
Water ices, com.	120	½ c.	**39.5**	**0.6**	**0**	**165**
			33.0	0.5	0	
Water oats (wild rice) . . .	20	⅛ c.	**13.1**	**2.8**	**0.2**	**65**
			65.4	14.0	0.9	
Water rolls	40	1	**21.7**	**3.6**	**1.2**	**115**
			54.2	9.0	3.0	
Watercress	20	½ c.	**0.1**	**0.6**	—	**3**
			*0.7	2.9	—	
Watermelon	240	1 c. diced	**16.0**	**0.9**	**0.4**	**75**
			6.7	0.4	0.2	
Waternut, tubers	100		**16.5**	**1.5**	**0.1**	**75**
			*16.5	1.5	0.1	

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

W

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Wax beans	75	½ c.	11.0 14.6	3.5 4.7	0.2 0.3	60
Wax beans, canned	130	⅔ c.	3.2 *2.5	1.3 1.0	0.1 0.1	20
Weakfish	230	½ lb.		40.9 17.8	5.5 2.4	220
Welsh rarebit	50		10.3 *20.7	7.6 15.2	17.7 35.5	250
Wesson oil	10	1 T.		— Trace	10.0 99.7	95
Wheat cereals, see Cereals.						
Wheat embryo	9	1 heaping t	4.3 48.1	2.4 27.2	1.0 11.2	35
Wheat flours, see Flours.						
Wheat, whole, ground	75	½ c.	56.6 75.5	8.3 11.1	1.3 1.7	280
Wheatena	30	¼ c.	21.7 72.7	3.2 10.8	0.8 2.5	110
Wheathearts, Sperry	30	3 T.	21.7 72.3	3.9 13.0	0.8 2.7	110
Wheaties	30	1 c.	23.5 78.3	3.3 11.0	0.5 1.7	110
Wheatsworth cereal, N. B. C.	30	¼ c.	21.2 70.8	4.2 14.0	0.6 2.0	110
Whelks, cooked	60	2 oz.	— Trace	10.7 17.8	1.1 1.9	55
Whey	225	1 c.	11.4 5.0	2.3 1.0	0.7 0.3	65
"Whipping" cream, see 32% Cream, p. 102.						
Whitefish	230	½ lb.		52.7 22.9	15.0 6.5	355
White fish, fried, av.	115	¼ lb.	7.4 6.4	21.2 19.3	13.7 11.9	245
White fish, steamed, av.	115	¼ lb.	0 0	25.8 22.4	1.6 1.4	115
Whiting	230	½ lb.		43.7 19.0	2.3 1.0	200
Whiting, fried	115	¼ lb.	8.0 *7.0	19.9 17.3	11.8 10.3	225
Whiting, steamed	115	¼ lb.		22.9 19.9	1.0 0.9	105
Whortleberries	100		10.3 *10.3	0.7 0.7	0.3 3.0	75
Wienerwurst	120	2, 7″ x ¾″	1.3 1.1	23.5 19.6	22.3 18.6	310
Wiltshire cheese	20	1 cu. in.	0.5 *2.3	6.8 34.2	3.9 19.3	65
Wintergreen extract, Burnett, A.P.	5	1 t.	0 0	0 0	0 0	0
Winkles, boiled	30	1 oz.	— Trace	5.3 17.6	0.8 2.6	30
Witloof chicory (French endive)	45	1 sm. crown	1.3 2.9	0.7 1.6	0.1 0.3	9
Worcestershire sauce, Lea & Perrins	5	1 t.	1.0 19.0	Trace 1.1	— Trace	4

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Y						
Yams, tubers, fresh	125	1, 5½″ x 1½″	**23.6** *18.7	**2.6** 2.1	**0.3** 0 2	**110**
Yautia (taniers, taye, cocoes)	100	1 tuber	**25.5** *25.5	**2.2** 2.2	**0.2** 0.2	**115**
Yeast, ale, dried	10	2 t.	**4.8** 48.4	**3.9** 38.9	**0.1** 1.2	**35**
Yeast, brewer's, Mead	11	2 t.	**4.3** 39 0	**4.2** 48.0	**0.2** 2 0	**35**
Yeast, compressed, baker's	12	1½″ sq.	**2.5** 21.0	**1.4** 11.7	**—** 0 4	**15**
Yeast, Fleischmann	15	1 cake	**1.2** *8.2	**2.1** 14.1	**0.1** 0 5	**14**
Yoghurt[1]	100	1 wine glass	**9.4** 9.4	**7.4** 7.4	**7.2** 7.2	**135**
Yoghurt cheese, American	30	2 T.		**5.2** 17.5	**9.0** 30 2	**105**
York cream cheese	25	2″ x 1½″ x 1″		**4.5** 17.9	**1.6** 6.5	**35**
Yorkshire pudding	50	1 sq.	**13.4** *26.8	**3.6** 7.2	**4.7** 9.4	**115**
Z						
Zucchini	75	2½″ x 2″	**1.6** 2.1	**1.8** 2.4	**—** —	**15**
Zwieback	5	1, 3″ x 1¼″	**3.7** 73.5	**0.5** 9.8	**0.5** 9.9	**20**
Zwieback, Sunshine	7	1 piece	**5.2** 77.3	**0.7** 9.8	**0.8** 12.1	**30**
Zwieback toast, N. B. C.	7	1 piece	**5.5** 79.1	**0.7** 10.6	**0.4** 6.2	**30**

[1] Alcohol, 0.2 per cent.
* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

STRAINED FOODS.

The **boldface numerals** indicate the number of grams and the calories in an average portion. The plain numerals indicate the percentage composition thereof. *Italicized* letters indicate trade names.

Table 19 A.—Strained Foods.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.*	Prot.	Fat.	Cal.
Beech-Nut:						
Apple and apricot	28.4	1 oz.	**4.9**	**0.1**	**0.1**	**22**
			17.5	0.3	0.5	
Apple sauce	28.4	1 oz.	**3.4**	**—**	**—**	**14**
			11.8	0.2	0.2	
Beans, green	28.4	1 oz.	**0.8**	**0.3**	**—**	**5**
			2.9	1.1	0.1	
Beets	28.4	1 oz.	**1.5**	**0.3**	**—**	**8**
			5.5	1.2	—	
Carrots	28.4	1 oz.	**1.7**	**0.1**	**—**	**8**
			5.9	0.4	0.2	
Chicken soup	28.4	1 oz.	**1.5**	**0.5**	**0.4**	**12**
			5.5	1.9	1.4	
Custard pudding	28.4	1 oz.	**4.9**	**0.7**	**0.6**	**28**
			17.4	2.4	2.1	
Liver soup	28.4	1 oz.	**2.0**	**0.9**	**0.3**	**14**
			7.0	3.2	1.0	
Peaches	28.4	1 oz.	**4.0**	**0.2**	**—**	**17**
			13.9	0.7	0.2	
Pears	28.4	1 oz.	**3.3**	**0.1**	**0.1**	**14**
			11.6	0.3	0.4	
Peas	28.4	1 oz.	**2.4**	**1.0**	**0.1**	**15**
			8.3	3.5	0.3	
Pineapple pudding	28.4	1 oz.	**5.3**	**0.5**	**0.3**	**26**
			19.1	1.7	0.9	
Prunes	28.4	1 oz.	**8.2**	**—**	**—**	**34**
			28.9	0.1	0.2	
Spinach	28.4	1 oz.	**0.6**	**0.6**	**0.1**	**6**
			2.3	2.0	0.4	
Tomatoes with milk	28.4	1 oz.	**4.1**	**0.8**	**0.4**	**24**
			14.6	2.9	1.5	
Vegetable and beef	28.4	1 oz.	**2.3**	**0.6**	**0.3**	**15**
			8.1	2.3	1.2	
Vegetable and lamb	28.4	1 oz.	**2.3**	**0.5**	**0.3**	**14**
			8.2	1.7	1.1	
Vegetable soup	28.4	1 oz.	**2.3**	**0.4**	**—**	**11**
			8.1	1.3	—	
Vegetables with bacon	28.4	1 oz.	**3.0**	**0.5**	**1.2**	**25**
			10.7	1.7	4.1	
Campbell Baby Soups:						
Beef	28.4	1 oz.	**2.2**	**1.1**	**0.3**	**15**
			7.6	3.9	0.9	
Chicken	28.4	1 oz.	**1.8**	**0.7**	**0.4**	**14**
			6.4	2.6	1.5	
Lamb	28.4	1 oz.	**2.0**	**0.9**	**0.6**	**17**
			7.2	3.1	2.1	
Liver	28.4	1 oz.	**2.1**	**1.0**	**0.3**	**15**
			7.5	3.4	0.9	
Vegetable	28.4	1 oz.	**2.6**	**0.6**	**0.1**	**14**
			9.3	2.0	0.5	

* All values exclude crude fiber.
Blank space indicates lack of data. Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.*	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Clapp:						
Apple sauce	28.4	1 oz.	**4.6**	**0.4**	**—**	**16**
			16.2	1.5	0.1	
Apricots and apples with farina	28.4	1 oz.	**4.4**	**0.2**	**—**	**19**
			15.5	0.8	0.1	
Beans, green	28.4	1 0z.	**0.5**	**0.8**	**—**	**6**
			1.9	2.8	0.1	
Carrots	28.4	1 oz.	**0.3**	**0.8**	**—**	**4**
			1.0	2.7	—	
Chicken soup	28.4	1 oz.	**1.9**	**1.0**	**0.4**	**16**
			6.8	3.7	1.5	
Custard pudding	28.4	1 oz.	**3.5**	**1.8**	**0.4**	**36**
			12.3	6.3	1.6	
Liver soup	28.4	1 oz.	**1.6**	**1.5**	**0.2**	**14**
			5.6	5.3	0.7	
Peaches	28.4	1 oz.	**3.1**	**0.5**	**—**	**15**
			10.8	1.9	—	
Pears	28.4	1 oz.	**2.9**	**0.5**	**—**	**14**
			10.1	1.7	0.1	
Peas	28.4	1 oz.	**0.8**	**1.7**	**0.1**	**11**
			3.0	5.9	0.3	
Pineapple pudding	28.4	1 oz.	**3.8**	**0.6**	**0.4**	**22**
			13.5	2.2	1.5	
Prunes	28.4	1 oz.	**5.4**	**0.7**	**—**	**25**
			19.2	2.5	—	
Squash	28.4	1 oz.	**1.0**	**0.6**	**0.1**	**7**
			3.4	2.3	0.3	
Vegetable soup	28.4	1 oz.	**2.1**	**0.7**	**—**	**11**
			7.4	2.4	Trace	
Vegetables, creamed	28.4	1 oz.	**2.6**	**0.7**	**0.4**	**17**
			9.3	2.4	1.3	
Vegetables, mixed	28.4	1 oz.	**2.4**	**0.6**	**—**	**12**
			8.4	2.0	0.1	
Vegetables with bacon	28.4	1 oz.	**2.1**	**0.4**	**0.6**	**16**
			7.4	1.6	2.2	
Vegetables with beef	28.4	1 oz.	**1.9**	**1.1**	**0.2**	**14**
			6.7	4.0	0.6	
Vegetables with lamb	28.4	1 oz.	**1.7**	**1.1**	**0.3**	**14**
			6.2	3.8	1.0	
Gerber:						
Apple sauce	28.4	1 oz.	**4.3**	**—**	**—**	**18**
			15.3	0.2	0.2	
Apricots with farina	28.4	1 oz.	**5.6**	**0.2**	**—**	**25**
			20.0	0.7	0.2	
Beans, green	28.4	1 oz.	**1.5**	**0.4**	**—**	**8**
			5.2	1.4	0.1	
Beets	28.4	1 oz.	**2.2**	**0.4**	**—**	**10**
			7.7	1.3	0.1	
Carrots	28.4	1 oz.	**1.6**	**0.2**	**—**	**8**
			5.7	0.6	0.1	
Chocolate custard	28.4	1 oz.	**4.1**	**1.0**	**1.1**	**31**
			14.7	3.5	3.9	
Custard pudding	28.4	1 oz.	**4.0**	**1.0**	**1.0**	**30**
			14.3	3.4	3.7	
Liver soup	28.4	1 oz.	**1.8**	**1.1**	**0.2**	**13**
			6.5	3.8	0.7	
Peaches	28.4	1 oz.	**3.5**	**0.2**	**0.3**	**18**
			12.4	0.5	0.9	
Pear pineapple	28.4	1 oz.	**3.4**	**0.1**	**—**	**14**
			12.0	0.3	0.1	
Pears	28.4	1 oz.	**3.4**	**0.1**	**—**	**15**
			12.2	0.4	0.2	
Peas	28.4	1 oz.	**2.1**	**1.0**	**0.1**	**13**
			7.4	3.5	0.4	

* All values exclude crude fiber.
Blank space indicates lack of data. Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.*	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Gerber: (cont.)						
Prunes	28.4	1 oz.	**6.3**	**0.2**	**0.1**	28
			22.6	0.8	0.3	
Spinach	28.4	1 oz.	**0.6**	**0.5**	**0.1**	6
			2.2	1.8	0.4	
Squash	28.4	1 oz.	**1.9**	**0.2**	—	9
			6.6	0.6	0.2	
Vegetable and lamb	28.4	1 oz.	**1.9**	**0.6**	**0.4**	13
			6.6	2.1	1.5	
Vegetable soup	28.4	1 oz.	**2.0**	**0.6**	**0.4**	14
			6.9	2.2	1.5	
Vegetables, mixed	28.4	1 oz.	**2.3**	**0.4**	—	11
			8.0	1.5	0.1	
Gerber's Meats:						
Strained beef	28.4	1 oz.		**4.9**	**1.1**	29
				17.1	3.8	
Strained liver	28.4	1 oz.		**4.6**	**1.0**	29
				16.2	3.6	
Strained veal	28.4	1 oz.		**4.4**	**0.7**	24
				15.5	2.5	
Heinz:						
Apple prune pudding	28.4	1 oz.	**6.8**	**0.4**	**0.4**	33
			24.5	1.5	1.3	
Apple sauce	28.4	1 oz.	**3.6**	—	—	15
			12.7	0.2	0.1	
Apricots and apple sauce	28.4	1 oz.	**4.0**	**0.2**	—	17
			14.4	0.6	0.1	
Apricots and oatmeal	28.4	1 oz.	**6.5**	**0.3**	**0.1**	28
			23.2	0.9	0.3	
Beans, green	28.4	1 oz.	**1.1**	**0.6**	—	7
			3.8	2.2	0.2	
Beef and liver soup	28.4	1 oz.	**1.8**	**1.2**	**0.6**	18
			6.5	4.4	2.3	
Beef broth with beef and barley	28.4	1 oz.	**2.4**	**0.7**	**0.4**	16
			8.3	2.5	1.6	
Beets	28.4	1 oz.	**2.4**	**0.4**	—	12
			8.5	1.5	0.1	
Carrots	28.4	1 oz.	**1.6**	**0.3**	—	8
			5.7	1.0	0.2	
Cereal for infants, precooked, dry	28.4	1 oz.	**20.5**	**4.3**	**0.6**	104
			72.1	15.1	2.2	
Custard pudding	28.4	1 oz.	**5.8**	**0.7**	**0.4**	30
			20.6	2.6	1.5	
Orange pudding	28.4	1 oz.	**6.1**	**0.5**	—	27
			21.8	1.7	0.2	
Peaches	28.4	1 oz.	**5.7**	**0.1**	—	24
			20.5	0.4	0.2	
Pears and pineapple	28.4	1 oz.	**3.8**	**0.1**	—	16
			13.7	0.4	0.1	
Pears with farina	28.4	1 oz.	**6.2**	**0.2**	—	26
			22.0	0.6	0.1	
Peas	28.4	1 oz.	**2.5**	**1.4**	**0.2**	17
			8.8	4.9	0.5	
Prunes	28.4	1 oz.	**9.0**	**0.3**	—	34
			28.2	1.1	0.2	
Spinach	28.4	1 oz.	**0.4**	**0.6**	**0.1**	5
			1.5	2.2	0.5	
Tomato juice	28.4	1 oz.	**1.2**	**0.3**	—	6
			4.4	1.0	0.1	
Tomato soup	28.4	1 oz.	**3.1**	**0.6**	—	16
			11.2	2.3	0.1	
Vegetable soup	28.4	1 oz.	**2.5**	**0.5**	—	12
			8.7	1.8	0.1	
Vegetables and lamb	28.4	1 oz.	**1.9**	**0.6**	**0.4**	13
			6.8	2.0	1.3	

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.*	Prot.	Fat	Cal.
Libby "Homogenized":						
Apple sauce	28.4	1 oz.	6.1	—	—	25
			21.4	0.2	0.2	
Apples and apricots	28.4	1 oz.	4.6	0.1	—	19
			16.4	0.4	0.1	
Apples and prunes	28.4	1 oz.	6.0	0.1	—	25
			21.3	0.4	0.4	
Apricot-farina	28.4	1 oz.	5.3	0.3	—	24
			18.8	0.9	Trace	
Beans, green	28.4	1 oz.	1.1	0.4	—	6
			3.9	1.4	Trace	
Beets	28.4	1 oz.	2.4	0.4	—	11
			8.4	1.5	—	
Carrots	28.4	1 oz.	2.0	0.2	—	9
			7.2	0.7	Trace	
Custard pudding	28.4	1 oz.	6.6	1.0	1.0	40
			23.4	3.7	3.4	
Fruits, mixed (apricots, peaches, pears)	28.4	1 oz.	4.8	0.2	—	21
			17.1	0.5	0.2	
Liver soup	28.4	1 oz.	2.2	1.1	—	14
			7.8	3.9	0.2	
Peaches	28.4	1 oz.	4.2	0.2	—	18
			15.0	0.6	0.1	
Pears and pineapple	28.4	1 oz.	4.1	0.1	—	17
			14.7	0.4	0.1	
Peas	28.4	1 oz.	1.9	0.8	—	11
			6.7	2.9	0.2	
Prunes with pineapple and lemon juices	28.4	1 oz.	7.4	0.3	—	32
			26.4	1.1	0.2	
Spinach	28.4	1 oz.	0.5	0.5	0.2	6
			1.7	1.7	0.5	
Squash	28.4	1 oz.	1.8	0.2	—	8
			6.3	0.8	Trace	
Vegetable soup	28.4	1 oz.	2.6	1.2	—	16
			9.3	4.1	Trace	
Vegetables, garden (carrots, peas, spinach)	28.4	1 oz.	1.7	0.5	—	9
			5.9	1.8	Trace	
Vegetables, mixed (green beans, pumpkin, tomato)	28.4	1 oz.	1.2	0.3	—	6
			4.3	1.0	Trace	
Vegetables with bacon	28.4	1 oz.	2.4	0.4	0.9	20
			8.5	1.6	3.2	
Vegetables with beef	28.4	1 oz.	1.7	1.2	—	12
			6.1	4.1	Trace	
Vegetables with lamb	28.4	1 oz.	2.2	1.0	0.8	21
			7.6	3.7	2.8	
Swift's Meats:						
Strained beef	28.4	1 oz.		5.0	0.8	27
				17.7	3.0	
Strained heart	28.4	1 oz.		3.8	0.7	22
				13.4	2.5	
Strained lamb	28.4	1 oz.		4.4	1.3	29
				15.6	4.5	
Strained liver	28.4	1 oz.		4.5	1.2	29
				15.9	4.3	
Strained pork	28.4	1 oz.		4.7	1.6	33
				16.7	5.6	
Strained veal	28.4	1 oz.		4.6	0.3	21
				16.4	1.0	

* All values exclude crude fiber.
Blank space indicates lack of data.

Negligible quantity is designated by —.

CHOPPED OR JUNIOR FOODS

The **boldface numerals** indicate the number of grams and the calories in an average portion. The plain numerals indicate the percentage composition thereof. *Italicized* letters indicate trade names.

TABLE 19 B.—**Chopped or Junior Foods.**

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.*	Prot.	Fat.	Cal.
Beech-Nut:						
Beans, green	28.4	1 oz.	**1.3**	**0.4**	**—**	**7**
			4.7	1.3	0.1	
Beets	28.4	1 oz.	**1.6**	**0.4**	**—**	**8**
			5.6	1.4	—	
Carrots	28.4	1 oz.	**2.2**	**0.2**	**—**	**10**
			7.8	0.8	0.1	
Chicken soup	28.4	1 oz.	**1.5**	**0.9**	**0.5**	**14**
			5.5	3.2	1.7	
Pineapple rice pudding	28.4	1 oz.	**5.6**	**0.5**	**0.3**	**27**
			19.9	1.8	1.1	
Prunes	28.4	1 oz.	**8.0**	**0.3**	**—**	**33**
			28.0	1.0	0.1	
Raisin-rice pudding	28.4	1 oz.	**7.2**	**0.7**	**0.4**	**35**
			25.3	2.4	1.5	
Spinach	28.4	1 oz.	**0.7**	**0.6**	**0.1**	**6**
			2.4	2.1	0.4	
Vegetable and beef	28.4	1 oz.	**2.5**	**1.0**	**0.2**	**16**
			8.8	3.4	0.8	
Vegetable and lamb	28.4	1 oz.	**2.6**	**0.6**	**0.3**	**16**
			9.3	2.3	1.1	
Vegetable soup	28.4	1 oz.	**2.6**	**0.3**	**—**	**12**
			9.4	1.2	0.1	
Vegetables with bacon	28.4	1 oz.	**2.8**	**0.4**	**1.0**	**22**
			9.9	1.5	3.5	
Clapp:						
Apple sauce	28.4	1 oz.	**3.8**	**0.4**	**—**	**17**
			13.5	1.6	0.1	
Apricots with farina	28.4	1 oz.	**2.8**	**0.7**	**—**	**14**
			9.9	2.4	Trace	
Baby cereal	28.4	1 oz.	**21.7**	**3.4**	**0.1**	**102**
			76.4	12.0	0.5	
Baby oatmeal	28.4	1 oz.	**21.2**	**4.0**	**0.3**	**103**
			74.6	14.2	1.2	
Carrots	28.4	1 oz.	**0.4**	**1.0**	**—**	**6**
			1.3	3.5	0.1	
Chicken soup	28.4	1 oz.	**2.4**	**0.5**	**—**	**12**
			8.3	1.9	0.1	
Chocolate pudding	28.4	1 oz.	**3.6**	**0.8**	**0.2**	**20**
			13.0	3.0	0.6	
Fish chowder	28.4	1 oz.	**2.2**	**0.5**	**—**	**11**
			7.6	1.8	0.2	
Peaches	28.4	1 oz.	**3.0**	**0.6**	**0.1**	**15**
			10.7	2.0	0.3	
Pears	28.4	1 oz.	**3.0**	**0.5**	**—**	**15**
			10.7	1.8	0.2	
Pineapple pudding	28.4	1 oz.	**3.0**	**1.0**	**0.4**	**20**
			10.7	3.5	1.5	

* All values exclude crude fiber.
Blank space indicates lack of data.

Negligible quantity is designated by —.

Food items.	Size of portion.		Value of portion.			
	Grams.	Household measure.	Carb.*	Prot.	Fat.	Cal.
Clapp: (cont.)						
Prunes	28.4	1 oz.	**5.5**	**0.8**	—	**25**
			19.5	2.7	0.1	
Spinach	28.4	1 oz.	—	**0.8**	**0.1**	**4**
			0.1	2.9	0.3	
Vegetable soup	28.4	1 oz.	**2.3**	**0.3**	—	**11**
			8.1	1.2	Trace	
Vegetables, creamed	28.4	1 oz.	**1.8**	**0.8**	**0.4**	**15**
			6.5	2.7	1.3	
Vegetables with bacon	28.4	1 oz.	**2.6**	**0.4**	**0.5**	**17**
			9.3	1.6	1.9	
Vegetables with beef	28.4	1 oz.	**2.3**	**0.8**	**0.3**	**15**
			8.0	3.0	0.9	
Vegetables with lamb	28.4	1 oz.	**2.4**	**0.6**	**0.1**	**13**
			8.4	2.2	0.4	
Vegetables with liver	28.4	1 oz.	**1.8**	**0.8**	—	**10**
			6.5	2.8	Trace	
Gerber:						
Apple prune pudding	28.4	1 oz.	**6.6**	**0.4**	**0.1**	**29**
			23.1	1.3	0.5	
Beans, green	28.4	1 oz.	**1.2**	**0.4**	—	**6**
			4.2	1.3	0.1	
Carrots	28.4	1 oz.	**1.6**	**0.2**	—	**8**
			5.6	0.6	0.2	
Peaches	28.4	1 oz.	**4.5**	**0.1**	—	**19**
			16.2	0.5	0.1	
Pineapple-rice pudding	28.4	1 oz.	**6.6**	**0.5**	**0.1**	**31**
			23.1	1.7	0.5	
Spinach	28.4	1 oz.	**0.7**	**0.6**	**0.1**	**6**
			2.5	2.1	0.4	
Vegetables and beef	28.4	1 oz.	**2.1**	**0.7**	**0.3**	**14**
			7.4	2.4	1.1	
Vegetables and lamb	28.4	1 oz.	**2.3**	**0.6**	**0.4**	**15**
			7.9	2.0	1.4	
Vegetables and liver	28.4	1 oz.	**2.0**	**0.6**	**0.1**	**11**
			7.3	2.1	0.3	
Gerber's Meats:						
Chopped beef	28.4	1 oz.		**6.8**	**0.7**	**33**
				23.8	2.5	
Chopped liver	28.4	1 oz.		**6.9**	**1.4**	**41**
				24.2	5.1	
Chopped veal	28.4	1 oz.		**6.6**	**0.5**	**31**
				23.2	1.7	
Heinz:						
Apple, fig and date dessert	28.4	1 oz.	**6.1**	**0.2**	**0.2**	**27**
			21.8	0.6	0.5	
Chicken farina vegetable porridge	28.4	1 oz.	**2.0**	**0.8**	**0.2**	**13**
			7.1	2.9	0.6	
Chopped carrots	28.4	1 oz.	**1.2**	**0.3**	—	**6**
			4.4	0.9	0.1	
Chopped green beans	28.4	1 oz.	**1.3**	**0.4**	—	**7**
			4.5	1.3	0.2	
Chopped mixed vegetables	28.4	1 oz.	**2.2**	**0.2**	—	**10**
			7.7	0.8	0.1	
Chopped spinach	28.4	1 oz.	**0.5**	**0.5**	—	**4**
			1.7	1.8	0.2	
Creamed diced vegetables	28.4	1 oz.	**2.5**	**0.6**	**0.3**	**15**
			8.8	2.1	1.2	
Creamed tomato and rice	28.4	1 oz.	**6.0**	**0.6**	**0.6**	**21**
			11.4	2.1	2.2	

* All values exclude crude fiber.
Blank space indicates lack of data. Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.*	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Heinz: (cont.)						
Pineapple rice pudding	28.4	1 oz.	**7.8**	**0.5**	**—**	**34**
			27.5	1.7	0.2	
Prune pudding	28.4	1 oz.	**7.2**	**0.6**	**0.3**	**33**
			25.2	2.0	0.9	
Vegetables with lamb and liver	28.4	1 oz.	**2.5**	**0.9**	**0.4**	**18**
			8.8	3.1	1.6	
Swift's Meats:						
Diced beef	28.4	1 oz.		**6.5**	**1.1**	**37**
				23.1	4.1	
Diced heart	28.4	1 oz.		**4.8**	**1.4**	**33**
				17.3	5.1	
Diced lamb	28.4	1 oz.		**5.1**	**1.8**	**37**
				18.2	6.3	
Diced liver	28.4	1 oz.		**5.3**	**1.5**	**35**
				18.7	5.2	
Diced pork	28.4	1 oz.		**6.2**	**2.0**	**43**
				22.1	7.1	
Diced veal	28.4	1 oz.		**5.7**	**0.6**	**28**
				20.4	2.1	

TABLE 20.—**Pre-cooked Baby Cereals.**

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.†	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
Clapp:						
Baby cereal	28.4	1 oz.	**21.7**	**3.4**	**0.1**	**102**
			76.4	12.0	0.5	
Baby oatmeal	28.4	1 oz.	**21.2**	**4.0**	**0.3**	**103**
			74.6	14.2	1.2	
Gerber:						
Barley cereal	28.4	1 oz.	**19.6**	**3.7**	**1.4**	**108**
			69.2	13.2	4.9	
Cereal food	28.4	1 oz.	**20.4**	**4.1**	**1.0**	**110**
			71.9	14.6	3.4	
Strained oatmeal	28.4	1 oz.	**18.6**	**4.2**	**2.0**	**112**
			65.6	14.7	7.3	
Heinz:						
Cereal for infants	28.4	1 oz.	**20.5**	**4.3**	**0.6**	**104**
			72.1	15.1	2.2	
Oatmeal	28.4	1 oz.	**18.1**	**4.8**	**1.5**	**108**
			63.9	16.8	5.5	

* All values exclude crude fiber.

† Exclusive of crude fiber which ranges from 1.0 to 1.9 per cent on the products listed.

RECIPED FOODS.†

Reciped foods have not been included in the main table of food nutrients unless subject to rigid commercial control or actually analyzed after "home" preparation. To complete such data the items in Table 21 have been calculated from standard recipes utilizing the analyses of the component parts. The data, when applied to specific instances, must be regarded as merely approximate.

Recipes from two sources have been incorporated in the following table: (1) Certain foods are shown with appended caloric ingredients for which the recipes are common knowledge; (2) all other items follow the recipes given in The Boston Cooking School Cook Book by Fannie Merritt Farmer, 1936 revised edition, Little, Brown and Company, Boston.

The calories have been entered in the nearest multiple of 5.

Italicized numbers in parentheses indicate the number of servings per recipe.

TABLE 21.—**Nutritive Value of Some Common Foods, Prepared According to Recipe.**

Food items.	Size of portion, household measure.	Value of portion.			
		Carb.	Prot.	Fat.	Cal.
Albumen water	1 c.	—	4.5	Trace	20
1 egg white					
Albumenized fruit juice	1 c.	4.5	4.5	Trace	40
¼ c. orange juice					
added to albumen water					
Beef, creamed chipped on toast (*3*) .	½ c. on 1 sl. toast	21.0	11.0	13.5	255
½ c. dried beef					
1 c. white sauce II					
Biscuits, baking powder (*20*) . .	1 biscuit	11.0	2.0	2.0	70
Broth	1 c.	0.1	5.0	—	20
Bouillon	1 c.	0.7	6.2	0.2	30
Cakes:					
Chocolate (*16*)	1 piece	26.0	3.0	5.5	170
2 T. cocoa added to plain cake					
Corn (Johnny cake) (*15*)	1 piece	19.0	3.0	1.5	105
¾ c. cornmeal					
1¼ c. white flour					
¼ c. sugar					
5 t. baking powder					
1 c. milk					
1 egg					
2 T. butter					

† From the Dietary Department of the New York Post-Graduate Hospital.

Blank space indicates lack of data. Negligible quantity is designated by —

Food items.	Size of portion, household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Cakes:					
Gingerbread *(20)*	1 piece	24.5	2.0	3.0	135
1 c. molasses					
2¼ c. white flour					
4 T. butter					
Plain *(16)*	1 piece	26.0	3.0	5.0	165
½ c. butter					
1 c. sugar					
2 eggs					
¾ c. milk					
1¾ c. white flour					
2½ t. baking powder					
Cake icing:					
Chocolate *(16)*	2 T.	15.0	0.5	1.5	80
1½ oz. chocolate added to plain icing					
Plain *(16)*	2 T.	14.5	0.5	—	60
1 c. sugar					
1 eggwhite					
Cereal gruel *(2)*	1 c.	6.5	1.5	1.0	40
4 T. cereal					
With cream *(2)*	1 c.	8.0	2.5	6.5	105
¼ c. light cream added to cereal gruel					
With milk *(2)*	1 c.	9.5	3.5	3.0	80
½ c. milk added to cereal gruel					
With water *(2)*	1 c.	3.3	0.7	0.5	20
2 T. cereal					
Chicken, creamed	½ c.	6.0	11.0	16.5	225
Chocolate syrup *(8)*	2 T.	11.5	1.0	1.0	60
¼ c. cocoa					
¾ c. sugar					
Cocoa, all milk	1 c.	17.0	7.0	8.5	180
One-half milk	1 c.	12.0	4.0	5.0	110
With cream	1 c.	17.5	1.0	12.0	210
Cookies, plain *(50)*	1	10.5	1.0	2.0	65
½ c. butter					
1 c. sugar					
½ c. milk					
2 eggs					
3 c. white flour					
2 t. baking powder					
Custard:					
Baked *(8)*	1 custard c.	20.5	8.0	8.0	190
Soft *(4)*	½ c.	21.0	6.0	8.5	190
Egg:					
[illegible]	1 c.	18.0	12.0	11.5	230
1 egg					
2 teaspoons sugar					
¾ c. milk					
Omelet *(2)*	Individual	1.5	14.5	24.5	295
Scrambled *(3)*	½ c.	2.0	0.5	3.5	45

Food items.	Size of portion, household measure	Value of portion			
		Carb.	Prot.	Fat.	Cal.
Gelatin, lemon flavor (*8*)	½ c.	30.0	2.0	—	130
Gravy, brown (*8*)	2 T.	2.0	0.5	3.5	45
Ice, orange (*12*)	½ c.	42.5	0.6	0	175
Junket (*2*) 1 c. milk 1 T. sugar	½ c.	13.5	4.0	5.0	120
Lemonade (*5*)	1 c.	24.5	0	0	100
Macaroni and cheese (*5*) ¾ c. uncooked macaroni ½ c. grated cheese 1 T. white flour 1½ T. butter 3 T. bread crumbs	1 c.	24.0	9.0	14.0	265
Milk:					
Chocolate malted 2 T. chocolate syrup added to malted milk	1 c.	37.5	9.5	8.0	270
Malted ⅞ c. milk 3 T. malted milk	1 c.	26.0	8.5	7.0	205
Mousse, vanilla (*5*)	½ c.	10.5	2.0	18.0	220
Muffins:					
Cornmeal (*8*)	1 large	22.0	4.0	3.0	135
Plain (*10*)	1	24.0	4.5	3.5	150
Potatoes:					
Creamed (*6*)	½ c.	14.5	4.0	12.0	190
Scalloped (*6*) 4 med. potatoes 1 T. white flour 1 T. butter 1 c. milk	½ c.	15.0	3.0	4.0	110
Hashed brown (*4*)	½ c.	15.5	2.0	10.5	170
Mashed (*6*)	½ c.	27.0	3.5	7.0	190
Prune whip (*8*)	½ c.	18.0	3.0	Trace	85
Puddings:					
Bread (*12*)	½ c.	33.0	10.5	10.0	270
Butterscotch (*6*)	½ c.	33.0	4.0	5.5	205
Chocolate bread (*12*) ⅔ c. cocoa added to bread pudding	½ c.	36.0	12.5	13.0	320
Chocolate cornstarch (*2*) ½ oz. chocolate, or 3 T. cocoa, added to cornstarch pudding	½ c.	31.0	6.5	8.0	230
Cornstarch (*2*)	½ c.	26.5	4.0	5.0	170
Rice (*7*)	½ c.	29.0	5.5	5.5	195

Blank space indicates lack of data. Negligible quantity is designated by —

Food items.	Size of portion, household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Puddings:					
Rice custard (4)	½ c.	29.0	5.0	6.0	195
1 c. cooked rice 1 c. milk ½ T. butter 1 egg 2 T. sugar ¼ c. raisins					
Tapioca (6)	½ c.	19.5	5.0	5.0	145
Salads:					
Chicken (4)	½ cup on 2 lettuce leaves	1.5	9.5	16.0	195
Cole slaw (2)	½ c.	3.5	1.0	8.5	100
1 c. shredded cabbage 2 T. cream dressing					
Fruit	1 c.	13.0	0.5	18.0	225
2 T. cream dressing Fresh fruit as desired					
Green	1 c.	3.0	1.0	20.0	200
1 c. salad greens 2 T. French dressing					
Potato (4)	½ c. on 2 lettuce leaves	8.0	3.5	13.5	175
Salmon (3)	½ c. on 2 lettuce leaves	0.5	17.5	23.5	295
1 c. salmon ½ c. diced celery 1 egg 6 lettuce leaves 3 T. mayonnaise					
Waldorf (6)	½ c. on 2 lettuce leaves	5.5	3.5	22.5	245
Salad dressings:					
Cream mayonnaise (8)	1 T.	0.2	0.1	9.0	85
½ c. mayonnaise 4 T. whipped cream					
Russian (8)	1 T.	1.5	0.3	8.0	85
¼ c. mayonnaise 2 T. cream 2 T. chili sauce					
Salmon, creamed	½ c. on 1 sl. of toast	22.0	11.0	17.0	295
Sandwiches:					
Cheese	1 sandwich	26.0	12.0	22.0	360
2 sl. bread 2 t. butter 1 sl. cheese Lettuce 1 t. mayonnaise					
Egg	1 sandwich	26.0	10.5	19.5	330
2 sl. bread 2 t. butter 1 egg Lettuce 1 t. mayonnaise					

Food items.	Size of portion, household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Sandwiches:					
Marmalade	1 sandwich	47.0	4.0	9.5	300
2 sl. bread					
2 t. butter					
1 t. marmalade					
Meat or fish	1 sandwich	26.0	12.0	15.5	300
2 sl. bread					
2 t. butter					
1 oz. meat or fish					
Lettuce					
1 t. mayonnaise					
Vegetable, 3 per cent	1 sandwich	29.0	4.0	14.0	265
2 sl. bread					
2 t. butter					
3 per cent vegetable					
1 t. mayonnaise					
Sauces:					
Caramel *(8)*	2 T.	28.5	—	—	115
Chocolate fudge *(12)*	2 T.	32.0	3.0	6.0	200
Custard	4 T.	10.5	3.0	4.5	100
Hard *(8)*	2 T.	44.0		8.0	255
Tomato, thin	¼ c.	4.0	1.0	3.5	55
Vanilla	2 T.	30.0	—	6.5	185
White I, thin (soup base)	½ c.	5.5	3.0	7.5	105
White II, medium (creamed foods)	2 T.	3.0	1.0	4.5	60
White III, thick (sauces)	2 T.	4.0	1.5	6.0	80
Tomatoes, scalloped *(2)*	½ c.	9.5	2.0	5.0	95
1 c. tomatoes					
½ sl. bread					
½ t. sugar					
2 t. butter					
Toast, milk *(6)*	1 sl.	19.5	5.0	8.0	175
Vegetables, creamed:					
Creamed 3 per cent vegetable	½ c.	6.0	1.5	4.5	75
2 T. white sauce II					
½ c. 3 per cent vegetable					
Creamed 6 per cent vegetable	½ c.	9.0	1.5	4.5	85
2 T. white sauce II					
½ c. 6 per cent vegetable					
Creamed 9 per cent vegetable	½ c.	12.0	1.5	4.5	100
2 T. white sauce II					
½ c. 9 per cent vegetable					
Creamed 12 per cent vegetable	½ c.	15.0	1.5	4.5	110
2 T. white sauce II					
½ c. 12 per cent vegetable					
Creamed 15 per cent vegetable	½ c.	18.0	1.5	4.5	120
2 T. white sauce II					
½ c. 15 per cent vegetable					

Blank space indicates lack of data. Negligible quantity is designated by —

CHAPTER 4.

ANALYSIS AND CLASSIFICATION OF FOOD.

Introduction.—The analysis of foods for the nutritive constituents has occupied a period of years and the efforts of many investigators. During this time methods and standards of judgment have changed. The results, therefore, are not strictly comparable. Ideal tabulation demands food values ascertained by the same methods and under identical conditions. Since no such complete data exist, what is available must be utilized with discretion.

Fats.—Fats are usually determined by ether extraction; this includes foreign matter as well as lipoids other than neutral fats. The error involved may be considerable.

Proteins.—Proteins are ascertained by digesting the food with sulphuric acid, aided by catalysts, such as copper sulphate, potassium sulphate and selenium, or by oxidizing agents, such as hydrogen peroxide. Nitrogen compounds are converted into ammonium salts. The ammonia is determined by distillation or aëration into acid and the amount computed by titration or nesslerization. Non-protein nitrogen is usually ignored and the total nitrogen found is multiplied by 6.25 to give "protein." In the case of certain foods, notably mushrooms and truffles, the nitrogen may be largely non-protein in character and of unknown food value.

Carbohydrates.—Carbohydrates most frequently are calculated "by difference" after direct determination of fats, proteins ($N \times 6.25$), ash, water and sometimes crude fiber. The combined errors of analysis thus fall upon the carbohydrate figure. They may be ascertained, also, by direct hydrolysis with mineral acid or enzymes followed by copper reduction or polariscopic examination. Not all reducing sugars are utilized by the body. The amount of carbohydrate actually available to the individual may be quite different from any of the figures obtained by analysis. The effect of cooking, mastication and digestion, particularly upon starch trapped within cellulose, may be considerable. Furthermore, certain organic acids, not determined by hydrolysis and reduction methods, may be converted into sugar after absorption. A very few experiments have been performed to ascertain "available" carbohydrate by using phlorizinized animals.

Wherever possible, carbohydrate data have been reported in the ensuing tables without fiber or other unassimilable matter. This is denoted by an asterisk on the percentage figure. Unfortunately this designation in most instances cannot be taken as representing true availability.

Classification of Fruits and Vegetables.—Classification of foods is an inevitable evil. Unless arranged according to a preconceived plan, vast stores of knowledge become inaccessible. Since natural phenomena do not fall into line with any scheme of classification, all grouping is to a certain extent artificial and hence, at times, confusing rather than helpful.

Strict adherence to any classification leads to absurdities. Fruits and vegetables cannot be listed according to their percentage composition without definite omissions. It is customary to insert cranberries, rhubarb, quince, and gooseberries into the groups indicated by the carbohydrate content of the raw fruits. No account is taken of the large amount of sugar added according to recipe to render the food palatable. Again, eggplant is declared to be of little food value, but as served it is far from being of negligible caloric content. In the practical listing of fruits and vegetables only such can be included as have been *analyzed in the form in which they can be eaten.*

Arrangement of foods according to their percentage composition has very obvious drawbacks. Regardless of the system of demarcation into groups, items within a few tenths per cent of each other will fall into different classes. If the class unit is large (as in 3, 10, and 20 per cent carbohydrates), foods of appreciable divergence in composition are necessarily grouped together. It would be more logical for the clinician who requires a printed sheet of permissible foods for the use of patients to list the fruits and vegetables in the order of increasing carbohydrate value. If percentages are appended to this list, the separation of allowed from forbidden foods is easily achieved. Too much attention, however, should not be centered upon the percentage composition. Practically, only the amount of carbohydrate per serving need be considered. Garlic, for instance, has no nutritive value despite its 20 per cent carbohydrate. The heat value of the so-called 3 per cent vegetables varies from 1 to 30 Calories per serving. It is impossible to permit a patient to have free access to all of the 3 per cent vegetables since the caloric content of these foods is presumably of paramount importance. Intelligent dietetic management requires that physician, dietitian, and patient have access to analytical data instead of mere lists of words.

The custom of classifying foods according to the predominating foodstuff frequently leads to the assumption that those of the same type are more or less comparable. When carbohydrate must be limited, deletion should be discriminatory rather than generalized. Although the potato is primarily a carbohydrate food, tuberin (the globulin of potato) is by no means a protein of inferior rank. Carbohydrate deficiency diseases are not common where the potato enters liberally into the diet. Its alkaline ash gives the potato a further advantage over rice and the farinaceous foods.

Classification of fruits and vegetables, however, can be very useful. Since those schemes devised in the past have not been wholly satisfactory, two new lists are presented.

Since the data in Table 25, Available Carbohydrates in Fruits and Vegetables (page 164), may be compared fairly, the following classification is offered for its practical value. Items which do not appear in Table 25 are enclosed in brackets. They are included for the sake of completeness.

VEGETABLES.

Group I. *Low-carbohydrate.*		Group II. *Moderate-carbohydrate.*	Group III. *High-carbohydrate.*
Asparagus	Kohlrabi	[Beets]	[Beans, baked]
Beans, string	Lambsquarters	Carrots	[Beans, kidney]
Beet greens	Leeks	Onions	[Beans, lima]
Broccoli	Lettuce	Parsnips	Corn
[Brussels sprouts]	[Mushrooms]	Peas	Dasheens
Cabbage	[Okra]	Peppers	[Lentils]
Cauliflower	Parsley	[Pimentos]	Potatoes, sweet
Celeriac	Radishes	Rutabagas	Potatoes, white
Celery	[Romaine]	Turnips	[Succotash]
[Celery cabbage]	[Sauerkraut]		Taro
Chard	Spinach		Yams
Cucumbers	Squash		
Dandelion greens	Tomatoes		
Dock or sorrel	[Turnip tops]		
[Endive]	[Vegetable marrow]		
Kale	[Watercress]		

FRUITS.

Group I. *Low-Carbohydrate.*	Group II. *Moderate-carbohydrate.*		Group III. *High-carbohydrate.*
Grapefruit	Apples	Oranges	Bananas
Melons	Apricots	Peaches	Grapes
Strawberries	Berries, except as noted	Pears	Persimmons
	Figs, fresh	Pineapple	[Prunes]
	Nectarines	Plums	
		Tangerines	

Williams, Olmsted, and their co-workers (1940) have emphasized the fact that classification of fruits and vegetables according to their supposed carbohydrate content is unscientific. The methods whereby carbohydrate values have been obtained are not above reproach and reclassification is in order. Based on their own data, these investigators present a new grouping of fruits and vegetables which more closely approximates their actual content of utilizable carbohydrate.

Williams-Olmsted Classification.

1 per cent. (0.3–2.0)	*3 per cent. (2.1–4.0)*	*5 per cent. (4.1–6.0)*
Asparagus	Beans, snap, young	Beans, snap, medium ✓
Broccoli	Brussels sprouts	Blackberries
Cauliflower ✓	Cabbage ✓	Carrots ✓
Celery	Cranberries	Currants
Cucumbers ✓	Eggplant	Muskmelon
Greens	Gooseberries ✓	Pumpkin
Rhubarb	Lemon juice ✓	Strawberries ✓
Squash, summer	Radishes ✓	Squash, winter
	Tomatoes ✓	Watermelon
	Turnips ✓	

7 per cent. (6.1–8.0)	*9 per cent. (8.1–10.0)*	*11 per cent. (10.1–12.0)*
Beets	Apricots ✓	Apples
Grapefruit ✓	Blueberries	Cherries
Onions ✓	Oranges ✓	Corn, sweet, young
Raspberries ✓	Orange juice ✓	Figs
Rutabagas	Peaches ✓	Grapes ✓
	Pears ✓	Nectarines
	Plums ✓	Parsnips
		Peas ✓
		Pineapple ✓

Classification of Flesh Foods.—As has been shown by Chatfield (1937) the present grouping of meats and poultry according to kind, cut, and method of cooking is unwieldy and none too accurate in practical application. It is suggested that a basis of comparison is possible under two headings: relative fatness and relative dryness.

Table 22.—**Classification of Meats.**

	Fat, per cent.	Protein, per cent.
Lean meat:		
Dry (very well done)	6	34
Medium done	6	30
Moist (rare)	6	27
Medium fat:		
Dry	18	30
Medium done	18	27
Moist	18	23
Fat, medium done	30	22
Very fat, medium done	45	17

The classification of fish is considerably more difficult because of rather wide variability in the fat content and is, therefore, not attempted.

Effect of Cooking Upon Foods.—Unless stated to the contrary, it is necessary to regard food analyses as having been made on the edible material in natural or commercial form. When such food is cooked, its composition is frequently quite different from that reported. Unfortunately very little data on actual analyses of

cooked foods are available. The chief reason has been the unwillingness of the chemist to complicate analytical procedures by the introduction of the extremely variable and often unpredictable factors which enter into the processes of food preparation.

Cooking of vegetables leads to a reduction of carbohydrate by an amount determined by the structure of the food, the method of cooking, the quantity of water used, the size of the pieces and the length of time heat is applied. In general, there is a decrease of one-third to one-half of the carbohydrate after cooking in water, the portion lost being largely of utilizable nature. "Thrice-cooked" vegetables contain little available carbohydrate; the greater part of the mineral salts and flavor also is lost. Ordinary boiling of vegetables removes about 5 per cent of the proteins, while the loss of fats is relatively slight. The analyses of cooked and uncooked foods will show marked differences when the water content changes appreciably.

The change in weight of meat during cooking is due chiefly to the loss of water, although in the case of certain meats, as bacon, it is caused by the removal of fats. Even in par-boiling, the water content diminishes. Boiling or steaming results in less removal of water due to volatilization; 3 to 20 per cent of the total solids may be found in meat broth. The loss of water and minerals is such that the percentage of salts remains the same in raw, boiled and steamed meat, but is higher in roasted meat. According to British investigators, beef, when fully cooked, loses the same amount of weight, water and salts whether cooking is commenced in hot or cold water. Ground beef free from visible fat shows changes in composition as follows:

	Water, per cent.	Protein, per cent.	Fat, per cent.	Ash, per cent.
Uncooked	75.2	21.2	2.5	1.2
Pan-broiled	61.7	33.4	3.9	1.6

TABLE 23. **Effect of Cooking Upon Composition of Meats.**

Food.	Mode of cooking.	Percentage loss of weight.	Percentage distribution of total loss.			
			Protein.	Fat.	Salts.	Water.
Bacon, very fat	Fried	61.7	0.4	52.5	1.2	45.9
Beef, 50-gram pieces	Boiled 1 hour	43.0	4.8	6.1	2.0	87.1
Beef, 1600 grams	Boiled	39.8	4.2	8.0	1.3	86.5
Beef, 1600 grams	Roasted	39.2	2.0	10.0	0.5	87.5
Catfish	Steamed	33.4	3.1	0.3	1.0	95.6
Cod	Steamed	31.5	4.7	0.8	1.0	93.5
Mutton, lean	Boiled	42.0	4.4	3.1	1.2	91.3
Mutton, very fat	Boiled	38.0	2.7	35.0	0.8	61.5

Pound for pound, overcooked meat contains more protein and probably more fat than undercooked. Investigation of nutritive values of canned meats and fish generally reveals a marked similarity to ordinary cooked foods.

From the data shown in Table 24 it is apparent that "the amount of protein in the rib cut, greatly increased due to fat and water losses

in cooking, becomes comparable with that of the lean, cooked top round ordinarily regarded as a more abundant source of protein."

Some difficulty may be encountered in estimating the caloric value of meats, as most of the analyses reported in the table are given for raw meat. The mode of cooking and serving may reduce the heat value by as much as 50 per cent. Sherman advocates crediting the meat with the protein content shown by the average of all analyses and the caloric value indicated for the lean cuts.

The increasing popularity of "water-less" cooking is to be highly commended. Nevertheless, tissue water released from plant foods on the application of heat invariably carries with it more or less mineral matter. The saving of minerals, however, is appreciable when compared to the loss on soaking or heating in added water. Actual experiments with spinach, mustard greens, cabbage, and turnip tops have shown that the conservation of salts is better when steaming or pressure-cooking methods are employed than when boiling is permitted. The iron content of broccoli diminishes 50 per cent after twenty minutes of boiling (Flanley and Johnson, 1932).

TABLE 24.—**Effect of Roasting on Composition of Paired Cuts of Steer Beef.***

Cut.	Official U. S. grade.	Preparation.	Fat, per cent.	Protein, per cent.	Total solids per cent.	Moisture, per cent.	Total ash, per cent.	Calcium, per cent.	Phosphorus, per cent.	Iron, per cent.
Clod	Good	Uncooked	18.2	21.1	41.2	58.8	0.964	0.012	0.156	0.0023
		Roasted	22.0	25.3	52.8	47.2	1.060	0.006	0.211	0.0026
Ribs	Good	Uncooked	31.0	19.8	51.8	48.3	0.812	0.009	0.136	0.0018
		Roasted	32.6	31.9	64.9	35.1	1.065	0.008	0.199	0.0021
Top round	Good	Uncooked	6.6	24.1	31.9	68.1	1.162	0.005	0.200	0.0022
		Roasted	9.0	30.6	39.3	60.7	1.117	0.011	0.214	0.0025

* Rogers, M., Gillum, I., Kunerth, B. L., and Pittman, M. S.: Jour. Am. Dietet. Assn., 13, 320, 1937.

The question of cooking water is subject to different interpretations depending upon the viewpoint. The matter of vitamin loss is considered subsequently. Investigations by McCance *et al.* (1936) have revealed that, while the decrease in the percentage composition of vegetables may be appreciable, these losses constitute only a very small fraction of the daily intake of minerals or carbohydrates. In other words, "the waste incurred by throwing away the water in which vegetables have been boiled is surprisingly small . . . and not of great dietetic significance."

Potatoes boiled in salt water lose potassium readily but take up considerable sodium. As observed by McCance (*Special Report No. 213, Med. Res. Council*, 1936): "At the beginning the sodium in the potato was negligible (only 5 mg. per 100 g.) while chloride ions amounted to 114 mg. per 100 g. During the cooking each 100 g. of potato took up about 250 mg. of sodium chloride. This

changed the K/Na ratio from 435/5 to 355/103. It is doubtful if life could be maintained indefinitely on a K/Na ratio of 435/5 while it is interesting to note that 355/103 is quite close to the K/Na ratios found in mammalian tissues. The improvement in taste to most palates requires no emphasis."

Highly salted foods, on the other hand, discharge sodium chloride into water in which they are boiled. It is to be expected that the minerals present in the food and those found in the tap water used for cooking will reach some sort of equilibrium, time and size of piece being important factors.

Studies in Arizona have revealed that vegetables cooked in fluorine-containing water picked up this element in proportion to their exposure. While a trace of fluorine (1 p.p.m.) in the water supply appears to have a beneficial effect in certain age groups in development of caries-resistant teeth, larger amounts can be toxic. Opinion is split on the advisability of raising municipal water supplies to 1 p.p.m. of fluorine. One must consider the possibility of concentrating such water during cooking and increasing the intake over that expected.

Acidified boiling water (vinegar) increases the removal of calcium from vegetables whereas alkalinity retards it. On the other hand, sodium bicarbonate hastens the cooking by softening the fiber which in turn allows mineral salts to escape. In the opinion of McCance, the addition of this base to cooking water for green vegetables makes little practical difference to the losses. For the effect upon vitamin potency, refer to p. 313.

Although the leaching effect of distilled water is greater than that of tap water, employment of hard water for cooking purposes is frequently undesirable. Calcium salts retard the rate of cooking unless precipitated by alkali. Heating of some proteins, notably those found in the leguminous plants, in the presence of much calcium leads to the formation of insoluble compounds which are digested, if at all, with considerable difficulty.

CHAPTER 5.

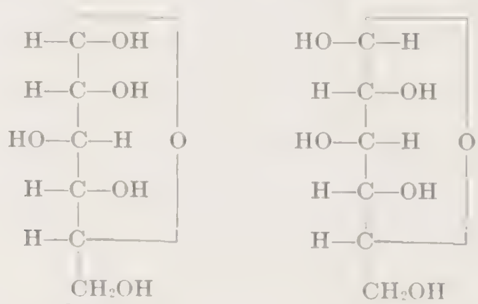
DETAILED COMPONENTS OF THE NUTRITIVE POOL.

It was at one time common to group foods as nutritive and non-nutritive according to whether or not they furnished energy. This classification is best avoided on the grounds that the former is useless without the latter in providing energy. It is proposed to treat of the major nutritive "elements" in this chapter and subsequently to give separate discussion to those minor nutritive "elements" identified as minerals and vitamins.

I. THE CARBOHYDRATE GROUP

The simple carbohydrates fall into two main groups: (1) Sweet, crystalline compounds soluble in water, such as sugars, and (2) tasteless, non-crystalline substances relatively insoluble in water, such as starch, glycogen, dextrin and inulin. The carbohydrates are polyhydric alcohols, with free or potential aldehyde or ketone groups, the insoluble ones being anhydrides of the sugars. The latter are stable in alkaline solution but not in acid whereas the reverse holds for the simple sugars.

Except as shall be mentioned later, the demand for carbohydrate resolves itself into need for glucose. It may be written as d-glucose to emphasize its dextrorotatory effect upon polarized light. In solution it exists as a mixture of α and β glucose:



α—d—glucose $\qquad$ β—d—glucose

The term γ glucose refers to an isomer with a 4-carbon-oxygen ring.

Carbohydrate Classification

Type	*Illustrative Food Sources*
I. Simple Carbohydrates	
A. Monosaccharides	
1. Hexoses, $C_6H_{12}O_6$	
(a) Glucose (dextrose, grape sugar)	Sweet fruits, honey, young sweet corn, onions
(b) Fructose (levulose, fruit sugar)	Sweet fruits, honey, tomatoes, mangos
(c) Galactose	Not found free, ingested in milk
(d) Mannose	Not found free, ingested in plant juices, as mannosans

2. Pentoses, $C_5H_{10}O_5$	Not found free, ingested as pentosans
(a) Arabinose	
(b) Ribose	
(c) Xylose	
3. Heptose, $C_7H_{14}O_7$	
(a) Mannoheptose	Avocado
B. Disaccharides, $C_{12}H_{22}O_{11}$	
1. Sucrose (glucose + fructose)	Beet and cane sugar, sweet fruits, honey, maple syrup, carrots
2. Lactose (glucose + galactose)	Milk and its products
3. Maltose (glucose + glucose)	Malt products
4. Trehalose (glucose + mannose?)	Mushrooms, yeast
II. Complex Carbohydrates: Polysaccharides	
1. Digestible, least complex, $(C_6H_{10}O_5)_n$	
1. Starches (glucose)	Bananas, chestnuts, grain products, legumes, potatoes
2. Dextrins (glucose)	Hones, germinating grains, toasted cereals
3. Glycogen (glucose)	Liver, muscles, meat, fish, poultry to about 1 per cent, mollusks 3–5 per cent
B. Partially Digestible	
1. Pentosans (pentoses) $(C_5H_8O_4)_n$	Gums, plums, grapes, cherries, yeast, nucleic acids in flesh products
2. Galactogens (galactose)	Snails, agar-agar, carrageen
3. Inulin (fructose)	Artichokes, burdock root, chicory, garlic, salsify; availability possibly dependent upon changes induced during storage.
4. Mannosans (mannose)	Legumes, plant seeds
5. Raffinose (trisaccharide: glucose, fructose, galactose)	Molasses, yeast, grains
C. Indigestible (most complex)	
1. Cellulose (glucose anhydride)	Plant fiber, leaves, stalks
2. Hemicellulose (glucose)	Young, tender leaves
3. Pectin (classed as hemicellulose)	Fruit jellies, tomatoes, root vegetables as beets, turnips, citrus albedo
III. Conjugated Carbohydrates	
A. Associated with protein groups	
1. Mucin (glucose)	Mucous secretions
2. Nucleic acids (pentoses)	Cellular protoplasm
B. Associated with lipid groups	
1. Cerebrosides (galactose)	Brain tissue
C. Associated with miscellaneous groups	

III. Conjugated Carbohydrates—*Continued*	
1. Highly active, usually bitter, often toxic plant products, generally termed glucosides	Source of drugs or other active preparations, as digitalin, saponins, amygdalin of bitter almonds, sinagrin of black mustard
IV. Derived Carbohydrates	
A. Alcohols	
1. Corresponding to sugar, $C_6H_8(OH)_6$	Sweet, crystalline solids found in plants, not fermentable by yeasts
(a) Sorbitol from glucose and fructose	
(b) Dulcitol from galactose	
(c) Mannitol from mannose	Widely distributed, common in fungi
2. Ethyl alcohol, C_2H_5OH	Glucose, fructose, maltose, sucrose fermented by yeast, also lactose by Kefir yeast
B. Acids	
1. Lactic acid, $CH_3.CHOH.COOH$	Organic acids or salts found in foods are generally classed with carbohydrates as they participate in release of energy. Role also in acid-base balance.
2. Citric acid, $CH_2.COOH$ | $C(OH).COOH$ | $CH_2.COOH$	
3. Malic acid, $CH_2.COOH$ | $CHOH.COOH$	
C. Amines	
1. Glucosamine (NH_2 group substituted for OH next to aldehyde group)	Enters into composition of mucin
2. Chondrosamine (similar galactose derivative)	Constituent of cartilage
D. Methyl Derivatives	
1. Rhamnose, $CHO.(CHOH)_4.CH_3$ (classed as pentose)	Methyl-pentoses often found in "glucosides," as hesperidin and naringin, bitter principles in orange peel and grapefruit respectively
2. Fucose, methyl-pentose	Obtained from marine algae, fucosan of sea-weeds

It can be seen that the carbohydrate fraction of the diet is far from uniform. While one commonly thinks of carbohydrates as just so much starch or sugar to be digested, it is likely that the future will reveal quite different behavior on the part of many of these agents in inter-relationship studies and it will be seen that each of the substances listed in the classification has its own work to do in living tissues.

Itemized functions of carbohydrates:

Glucose

1. To meet a specific, but little known, cell need.
2. To provide fuel for general use.
3. To be stored in liver and muscles as glycogen, as a reserve
4. To be oxidized to glycuronic acid for detoxication purposes

Galactose

1. To manufacture milk, as a specific need
2. To build nervous tissue, as cerebrosides

Pentoses

1. To furnish a specific essential, as riboflavin
2. To produce nucleic acids

Disaccharides

1. To provide glucose
2. To furnish lactose, a slowly digested sugar, as a substrate for intestinal bacteria, increasing acidity of the region

Polysaccharides

1. To provide glucose
2. To increase intestinal motility
    (a) With fiber or roughage
    (b) With water-absorbing lubricants, as pectin
3. To diminish need for B vitamins (dietary sucrose makes the greatest demand for vitamins, glucose next, then in decreasing order lactose, starch, dextrin)
4. To furnish a substrate for intestinal bacteria concerned with synthesis of B vitamins (pyridoxine is synthesized in test animals when sucrose is replaced by dextrin)

Derived carbohydrates

1. To provide lubrication, as with mucin
2. To provide building material, as for cartilage

Those sugars already at the simplest chemical level are ready for absorption. More complex ones require time for digestion and thus offer a more steady and prolonged period of absorption with less of a load on the liver. About 50 per cent of the total carbohydrate of an average American diet is starch. Although starch is classed as digestible, that fact depends upon proper cooking and release from within undigestible cell walls. Knowledge is still incomplete with respect to many plant polysaccharides. Digestive enzymes are lacking for their hydrolysis, yet they disappear presumably under bacterial attack. The fate of the products is a matter of conjecture.

Although the larger fraction of carbohydrates in the normal, well-rounded diet can be counted on to furnish 4 calories per gram, this may not be true of a restricted intake. Unassimilable carbohydrate

included in the diet to give bulk and to promote regular peristalsis is, of course, without caloric value. Sugars, especially lactose, are frequently prescribed for the bacterial flora of the colon rather than as fuel for the host. Where sugar serves as a substrate for bacterial action, fermentation occurs and the formation of such acids as acetic, butyric and lactic favors alimentary evacuation.

Available Carbohydrates.

In the preceding tables an effort has been made to designate assimilable carbohydrates by the use of an asterisk on the percentage value. It is recognized that this does not represent true availability in every instance. The complex nature of naturally-occurring carbohydrates renders the problem a difficult one, affected not only by lack of chemical data but by modes of cooking and differences in digestibility. Table 25, therefore, provides desirable data regarding a restricted group of foods.

The analyses shown in Table 25 are from E. M. Widdowson and R. A. McCance (*Biochem. Jour.*, **29**, 151, 1935). McCance and his co-workers have made outstanding contributions to our knowledge of the chemical composition of foodstuffs. Further analyses on the carbohydrates of various classes of foods will be found in Special Report No. 213 of the Medical Research Council of Great Britain (1936). The total carbohydrate available in stewed fruit (apart from that which may be added) is as follows: apples 4.4, dried apricots 18, blackberries 3.2, cherries 4.1,[1] black currants 4.6, red currants 3.2, damsons 6.6,[1] dried figs 30, gooseberries 1.7, green gages 7.6,[1] dried peaches 18, pears 6.5, plums 6.1,[1] dried prunes 15.5[1], raspberries 3.8, and rhubarb 0.7 grams per 100 grams.

TABLE 25.—Available Carbohydrates in Fruits and Vegetables.

Food items.	*Sugar, per cent.*	*Total available carbohydrate, per cent.*	*Water content, per cent.*
Apples, baked	12.0		
Crab	12.6		81.1
Crab, juice	11.2		85.0
Empire, eating*		12.2	84.1
English, cooking*		9.6	85.6
English, eating*		11.7	84.5
Fall	10.4		85.4
George Washington	12.7		
Northern Spy	14.0		
Summer	9.4		86.5
Winter	11.2		83.6
Apple juice	10.5		87.1
Apricots, American	10.4		85.4

[1] Weighed with stones. * Flesh only: no skin.

Food items.	*Sugar per cent.*	*Total available carbohydrate, per cent.*	*Water content, per cent*
Apricots, English		6.7	86.6
Asparagus, boiled	0.8		
Asparagus-beans, green pods		7.8	84.5
Avocados, Fuerte	0.6		65.4
Bananas		19.2	74.8
Very green	1.8		
Green	5.8	21.4	
Medium ripe	15.4		
Very ripe	18.2	18.9	
Beans, lima, canned	1.6		
Beans, snap		2.6	88.9
Beans, string, green, raw	3.4		91.4
Beans, string, boiled	1.5		94.6
Beet greens	0.5		90.4
Blackberries	6.1		85.3
Blackberry juice	5.4		92.3
Blueberries	9.7		83.4
Blueberry juice	12.4		85.9
Broccoli	1.9		89.9
Burdock root		7.6	72.4
Cabbage		5.1	92.4
Cabbage, boiled	1.1		96.6
Cabbage, raw	4.9	5.8	91.5
Cabbage, Chinese		1.1	95.2
Cantaloupe		5.3	93.6
Carrots		7.6	88.2
Carrots, boiled	3.7		
Carrots, raw	8.7	9.0	88.2
Cauliflower, boiled once	1.7		93.9
Cauliflower, boiled "thrice"	0.7	0.8	95.0
Cauliflower, raw	1.9	2.9	92.6
Celeriac		0.9	88.3
Celery		1.3	93.7
Celery hearts, raw	1.9		
Celery, outside portion, raw	0.5	0.6	95.2
Celery, outside portion, cooked	0.3	0.4	96.7
Chard, leaves		0.9	91.0
Chard, stalks		1.8	95.2
Cherries, American, sour	9.5		84.4
Cherries, American, sweet	11.6		80.0
Cherries, English, cooking	11.6		79.8
Cherries, English, eating	11.9		81.5
Corn, young		13.9	80.3
Corn, medium		20.1	72.4
Corn, old		24.8	65.7
Cranberries, American	4.2		87.4
Cranberries, English		3.5	87.0
Cucumber	2.6		96.1

Food items.	*Sugar, per cent.*	*Total available carbohydrate, per cent.*	*Water content, per cent.*
Currants, black		6.6	77.4
Currants, red		4.4	82.8
Currants, white		5.6	83.3
Currant juice, black	10.9		
Currant juice, red	6.2		89.1
Damson plums, American	8.7		78.8
Damson plums, English		9.6	77.5
Dandelion greens		0.9	85.8
Dasheens		23.5	66.6
Dates		63.9	14.6
Dock or sorrel		0.1	93.3
Figs	16.2		78.0
Figs, green		9.5	84.6
Gooseberries, green		3.4	89.9
Gooseberries, ripe		9.2	83.7
Grapefruit		5.3	90.7
Grapefruit	6.5		88.8
Grapefruit juice	6.8		89.7
Grapes, American	11.5		81.9
Black*		15.5	80.7
European	14.9		81.6
Malaga	22.5		
White		16.1	79.3
Grape juice:			
Catawba type	17.9		79.1
Concord	15.7		82.1
Delaware	19.9		77.3
European	19.8		77.1
Muscadine	12.5		86.7
Greengage plums		11.8	78.2
Guavas, common	6.1		80.6
Guavas, strawberry	6.7		79.3
Kale		1.4	86.6
Kohlrabi	2.2		90.1
Lambsquarters		1.7	84.2
Leeks		4.0	88.2
Lemon		3.2	85.2
Lemon	2.2		89.3
Lemon juice		1.6	91.3
Lettuce, green leaves	0.9		
Lettuce, white leaves	1.7		94.8
Limes	0.5		86.0
Limes, sweet	6.0		89.6
Lime juice	0.3		91.3
Loganberries, American	6.0		82.9
Loganberries, English		3.4	85.0
Loganberry juice	6.5		88.9

* Flesh only; no skin.

Food items.	Sugar, per cent.	Total available carbohydrate, per cent.	Water content, per cent.
Mandarin orange	8.7		87.3
Mandarin orange juice	7.8		89.2
Mangos	13.7		81.4
Melons, yellow, English		5.0	94.2
Mulberries		8.1	85.0
Muskmelon	5.4		92.8
Muskmelon juice	9.1		87.2
Nectarines	11.8		82.9
Oca, tubers		14.7	80.9
Oranges		8.5	86.1
Oranges, Seville	6.0		87.0
Orange juice		9.4	87.7
Orange juice	6.8		
Onions, average		7.2	87.5
Onions, boiled	6.1		
Onions, raw	8.3		
Onions, young green		4.2	87.6
Papaya	9.0		88.7
Parsley	2.8		87.6
Parsnips, raw		11.9	78.6
Peaches, English		9.1	86.7
Georgia	9.4		85.8
Maryland	8.6		87.1
New Jersey	7.6		88.8
North Carolina	9.2		86.4
Peach juice	11.8		86.5
Pears, Bartlett	8.3		83.5
Empire eating*		10.8	83.0
English cooking*		10.4	83.4
English eating*		9.3	83.0
Winter	11.9		
Peas, green, young		7.2	81.4
Peas, green, medium		9.0	75.8
Peas, green, old		14.6	65.0
Peas, green, boiled	2.8		
Peppers, green		5.9	92.4
Peppers, red	3.0		89.2
Persimmons, Japanese	15.9		78.2
Persimmons, native American	18.9		64.4
Pineapple, fresh		11.6	84.3
Pineapple juice	11.8		86.2
Plantains	25.3		64.7
Plums, American	8.3		85.7
Plums, English cooking		6.2	85.1
Plums, English dessert		9.6	85.1
Pomegranate, pulp with seeds	11.9		75.8
Pomegranate juice		11.6	85.4

* Flesh only; no skin.

Food items.	*Sugar, per cent.*	*Total available carbohydrate, per cent.*	*Water content, per cent.*
Potatoes, sweet	5.4	25.6	68.5
Potatoes, white		24.4	78.3
Potatoes, white, boiled		17.8	
Pumpkin		5.1	90.5
Quince	9.1		85.3
Quince juice	6.3		
Radishes	3.4		93.6
Raspberries, American black	7.9		80.7
American black, juice	7.6		88.4
American red	7.2		83.4
American red, juice	7.3		90.8
English		5.6	83.2
Rhubarb	0.4		94.9
Rutabagas	6.7		89.1
Soy beans, green, shelled		4.6	64.7
Spinach	0.3		92.7
Spinach, New Zealand	0.9		91.4
Squash, raw, cushaw		5.1	90.4
Raw, summer		1.4	95.0
Raw, winter		4.9	88.6
Boiled once	2.9		93.7
Boiled thrice	2.6		94.0
Raw	5.0		91.1
Strawberries, American	5.3		90.0
Strawberries, American, medium ripe	4.1		
Strawberries, English		6.2	88.9
Strawberry juice	3.6		94.2
Taro		19.6	75.1
Tangerines	8.7		87.3
Tangerine juice	7.8		89.2
Tomatoes, ripe, American, raw		3.5	94.1
Ripe, American, boiled		2.5	
Ripe, American, canned		3.3	
Ripe, English		2.8	
Green		1.6	94.7
Turnips	4.6		90.9
Watermelon	6.0		92.1
Yams		18.7	72.6

Unavailable Carbohydrates

Attention is directed particularly to cellulose or crude fiber and to the hexopentosans or pectins. On hydrolysis the latter yield both hexose (as galactose) and pentose (as arabinose) as well as galacturonic acid. Because of their capacity for absorbing water, pectins are employed therapeutically in both diarrhea and constipation.

The fate of fiber in the diet is variable depending upon the character of the bacterial flora in the colon and upon the resistance of the fiber to attack. In studies conducted by Cowgill and Sullivan (1933) a quantitative relationship was demonstrated in healthy men between the fiber content of the diet and the degree of laxation. They have placed the physiological minimum at 90-100 mg. of fiber per kilogram of body weight per day. In constipation, however, fiber in the diet may undergo decomposition during passage of the alimentary tract and so fail to function in the mechanical stimulation necessary for evacuation. Where marked bacterial activity is encountered, it is customary to prescribe commercial bran or processed bran products to exceed the capacity for rendering fiber inert in the colon. The average person requires merely adequacy of roughage in the form of vegetables, fruits, and cereals together with a certain amount of fat and plenty of fluid to secure normal removal of intestinal wastes. Those who harbor strains of bacteria capable of disintegrating mixed plant fiber require variable supplements of wheat bran. Where the colon is narrowed, ulcerated or highly irritable, bran is contraindicated and bland diets together with pectins are in order.

Table 26.—Crude Fiber Content of Some Foods.

Those items designated *mws* show analyses by R. A. McCance, E. M. Widdowson and L. R. B. Shackleton on foods purchased in Great Britain (Medical Research Council Special Report No. 213, 1936). Otherwise analytical data was obtained largely from U. S. Department of Agriculture Circulars 50 and 146. An asterisk (*) denotes that the figure is based on the weight of raw material contained in an average serving of ½ cup; data in part from J. L. Kantor and L. F. Cooper (*Ann. Internal Med.*, **10**, 965, 1937). A double dagger indicates that the analyses were made by F. C. Hummel, M. L. Shepherd, I. G. Macy (*Jour. Am. Dietet. Assn.*, **16**, 199, 1940); the figure in parenthesis represents the *percentage* of the total fiber in the form of the highly indigestible lignin. It will be noted that the English values for unavailable carbohydrate are consistently higher than the others.

	Size of portion.		*Fiber.*	
Food items.	*Grams.*	*Household measures.*	*Per cent.*	*Grams per portion.*
Almond butter	15	1 T.	3.9	0.58
Meal	25	2 T.	2.9	0.73
Paste	10	1 t.	7.8	0.78
Almonds	30	20	3.0	0.90
mws	30	20	12.0	3.60
Apple, fig and date dessert, Heinz	60	2 oz.	1.0	0.60
Apple powder	8	1 T.	6.7	0.54
Sauce	135	½ c.	0.8	1.08
Sauce, strained, canned	135	½ c.	0.5	0.68
Apples	130	1, 2½″ diam.	1.0	1.30
Apples‡	130	1, 2½″ diam.	0.8 (27)	1.04
Eating, *mws*	130	1, 2½″ diam.	2.2	2.86
Cooking, *mws*	130	1, 2½″ diam.	2.4	3.12
Baked, canned	120	1, 2½″ diam.	0.7	0.84
Apricots	50	2 med.	0.6	0.30
mws	50	2 med.	2.1	1.05
Canned	70	3 halves	0.5	0.35
mws	70	3 halves	1.3	0.91
Strained, canned	15	1 T.	0.6	0.09
Dried	10	1 T.	3.2	0.32
mws	10	1 T.	24.0	2.40
Artichokes, globe	50	1 lg.	3.2	1.60
Jerusalem	100	1 lg.	0.8	0.80
Asparagus	75	6, 6″ stalks	0.7	0.52
Boiled, *mws*	75	5 spears	1.5	***
*** Only 50 per cent of cooked weight is edible.				
Tips, canned	75	5 spears	0.6	0.45
Strained, canned	14	1 T.	0.5	0.07
Avocados, av.	85	½, 3½″ long	1.4	1.19
mws	85	½, 3½″ long	2.0	1.70
Bamboo shoots	100	¾ c.	0.8	0.80
Banana powder	8	1 T.	3.3	0.26
Bananas	100	1 sm.	0.6	0.60
mws	100	1 sm.	3.4	3.40
Ripe‡	100	1 sm.	0.8 (60)	0.80
Barley, pearled	30	3 T.	0.3	0.09
Bean soup	250	1 c.	0.4	1.00
Bean sprouts	65	½ c.	1.0	0.65
Beans, baked	250	1 c.	1.4	3.50
mws	250	1 c.	5.1	12.75
canned	250	1 c.	1.0	2.50
Broad, green, shelled	75	½ c.	2.0	1.50
Broad, boiled, *mws*	125	½ c.	4.2	5.25
Butter, boiled, *mws*	100	½ c.	5.1	5.10
Lima, green	60	½ c.*	1.5	0.90
Canned	130	½ c.	1.2	1.56
Baby, canned	130	½ c.	1.0	1.30
String	75	½ c.*	1.4	1.05
Small, whole stringless, canned	100	½ c.	0.4	0.40

Food items.	Size of portion: Grams	Size of portion: Household measures.	Fiber: Per cent.	Fiber: Grams per portion.
Beans:				
Strained, green, canned	14	1 T.	1.0	0.14
Dried, navy	75	½ c.	4.4	3.30
Soy	100	½ c.	4.6	4.60
Beef and liver soup, Heinz	30	1 oz.	0.2	0.06
Beef (roast) hash, canned	230	½ lb.	0.3	0.69
Beef stew, canned	115	¼ lb.	0.3	0.35
Beet greens	75	½ c.*	1.4	1.05
Beets	75	½ c.*	0.9	0.68
Boiled, *mws*	75	½ c.	2.5	1.87
Strained, canned	15	1 T.	0.5	0.08
Bemax	9	1 heaping T.	1.5	0.14
Biscuits, baking powder	75	1 lg.	0.2	0.15
Blackberries	75	⅔ c.	4.1	3.08
mws	75	⅔ c.	7.3	5.47
Canned	120	⅔ c.	2.5	3.00
Blueberries	100	⅔ c.	1.2	1.20
Canned	120	½ c.	1.0	1.20
Bran flakes	30	⅔ c.	5.1	1.53
Bran Flakes, Post's 40%	30	⅔ c.	3.9	1.17
Bran, prepared	3	1 T.	8.5	0.25
Bran Shreds, Post's	3	1 T.	8.3	0.25
Bran, wheat, crude	3	1 T.	11.3	0.34
Brazil nuts	30	4 av.	3.9	1.17
mws	30	4 av.	14.7	4.41
Bread, pumpernickel	30	1 sl.	1.3	0.39
Rye	25	1 sl.	0.5	0.12
Rye, whole	30	1 sl.	1.2	0.36
White	25	1 sl.	0.5	0.12
White‡	25	1 sl.	0.8 (8)	0.20
Whole wheat	30	1 sl.	1.2	0.36
Whole wheat‡	30	1 sl.	2.8 (16)	0.84
Breakfast Crisp, Cellu	3	1 T.	22.6	0.68
Breakfast Wheat, Heinz	20	2 T.	5.6	1.12
Broccoli	100	1 med. stalk	1.3	1.30
Boiled, *mws*	100	1 med. stalk	4.2	4.20
Brussels sprouts	100	1 c.	1.3	1.30
Boiled, *mws*	100	1 c.	4.8	4.80
Butter	..		0.0	
Cabbage‡	85	1 c.	1.0 (10)	0.85
Boiled, *mws*	100	½ c.	2.2	2.20
Chinese	110	1 c.	0.6	0.66
Red, *mws*	85	1 c.	3.4	2.89
Cakes, various types	60	1	0.1	0.06
Fruit (dark)	60	1	1.2	0.72
Candied peel (lemon, orange, grapefruit)	10	1 sm. piece	2.3	0.23
Cantaloupe	100	¼, 5″ diam.	0.3	0.30
mws	100	¼, 5″ diam.	1.0	1.00
Carrageen moss, dried	10	1 T.	71.3	7.13
Carrots‡	75	½ c.*	1.1 (10)	0.83
Boiled, *mws*	75	½ c.	3.0	2.25
Chopped, Heinz	30	1 oz.	0.7	0.21
Strained, canned	15	1 T.	0.6	0.09
Cashew nuts, cooked, salted	15	10	1.3	0.20
Catsup, tomato	20	1 T.	0.4	0.08
Cauliflower	75	½ c.*	0.9	0.68
Boiled, *mws*	75	½ c.	2.4	1.80
Celeriac	100	1 med.	1.4	1.40
Boiled, *mws*	100		4.9	4.90
Celery	40	2, 7″ stalks	0.7	0.28
mws	40	2, 7″ stalks	1.8	0.72
Boiled, *mws*	50	½ c.	2.2	1.10
Strained, canned	20	4 t.	0.8	0.16

Food items.	Size of portion. Grams	Size of portion. Household measures.	Fiber. Per cent.	Fiber. Grams per portion.
Cemac, Mead	15	1 T.	0.3	0.05
Cereal, Strained, Beech-Nut	25	5 t.	0.2	0.05
Wheatheart, Clapp	15	1 T.	0.2	0.03
Cerevim	30	½ c.	2.5	0.75
Chard, leaves only	100	1½ c.	0.8	0.80
Cheese	..		0.0	
Cherries	75	½ c.	0.3	0.23
mws	75	½ c.	1.7	1.27
Black, canned	85	15	0.1	0.09
Maraschino, bottled	5	1	0.3	0.02
Royal Anne, canned	85	15	0.2	0.17
Chestnuts	25	4	1.5	0.38
mws	25	4	9.3	2.32
Chickory, leaves	20	½ c.	0.8	0.16
Chili sauce	20	1 T.	0.7	0.14
Chives	55	½ c.	2.0	1.10
Chocolate, sweetened	30	1 oz.	2.0	0.60
Unsweetened	30	1 oz.	2.5	0.75
Citron, candied	10	1 sm. piece	1.4	0.14
Cocoa powder	5	2 t.	4.0	0.20
Cocoanut	10	1″ sq.	3.4	0.34
mws	10	1″ sq.	7.6	0.76
Desiccated	4	1 T.	4.1	0.16
Moist, canned	5	1 T.	4.2	0.21
Cocoanut milk, *mws*	..		0.0	
Collards	50	½ c.	1.0	0.50
Cookies:				
Fig bars	30	2	1.7	0.51
Gingersnaps	20	3	0.4	0.08
Home-made type	20	1	0.2	0.04
Macaroons	40	1 lg.	1.1	0.44
Molasses	20	1	0.4	0.08
Oatmeal	20	1	0.3	0.06
Peanut	20	1, 3″ diam.	0.8	0.16
Sandwich-type	25	2	0.3	0.07
Shortbread	25	3	0.1	0.02
Wafers	15	4	0.2	0.03
Corn, sweet	75	½ c.*	0.8	0.60
Cream style, canned	115	½ c.	0.3	0.35
Whole kernel, canned	100	½ c.	0.6	0.60
Corn Flakes, Kellogg's	30	1⅓ c.	0.4	0.12
Corn Flakes‡	30	1⅓ c.	1.4 (15)	0.42
Corn beef hash, canned	230	½ lb.	0.5	1.15
Cornmeal	20	½ c.*	0.4	0.08
Yellow, old-type	100	⅔ c.	1.8	1.80
Cornsalad	25	⅓ c.	0.8	0.20
Cracked wheat	30	¼ c.	2.7	0.81
Crackers, Graham	25	3, 3″ sq.	1.5	0.38
Graham‡	25	3, 3″ sq.	2.2 (40)	0.55
Soda	10	2, 2″ sq.	0.3	0.03
Cranberries	50	½ c.	1.4	0.70
mws	50	½ c.	4.2	2.10
Cranberry sauce, canned	100	⅓ c.	0.4	0.40
Cream of Wheat, "5-minute"	20	½ c.*	0.5	0.10
Cress, garden	20	½ c.	1.2	0.24
Cucumbers	75	2″ x 2¼″	0.5	0.38
mws	75	2″ x 2¼″	0.4	0.30
Currants, all, av.	50	½ c.	3.2	1.60
Black, *mws*	25	¼ c.	8.7	2.17
Red, *mws*	25	¼ c.	8.2	2.05
White, *mws*	25	¼ c.	6.8	1.70
Dried, *mws*	50	⅓ c.	6.5	3.25
Damson plums, *mws*	50	4 med.	4.1	2.05

Food items.	Size of portion. Grams.	Household measures.	Fiber. Per cent.	Grams per portion
Dandelion greens	50	½ c.	1.8	0.90
Dasheens	100	1 tuber	0.7	0.70
Dates, dried	15	3 sm.	2.2	0.33
mws	15	3 sm.	8.7	1.30
Dock or Sorrel	25	½ c.	0.8	0.20
Doughnuts	45	1, 3″ diam.	0.2	0.09
Eggplant	75	½ c.*	0.9	0.68
mws	75	½ c.	2.5	1.87
Eggs			0.0	
Embo	8	1 T.	2.0	0.16
Endive, chicory, leaves	15	¼ sm. head	0.8	0.12
mws	15	¼ sm. head	2.2	0.33
Farina	20	½ c.*	0.2	0.04
strained, Beech-Nut	25	5 t.	0.1	0.03
Fennel	50	⅓, 3″ diam.	0.8	0.40
Figs, fresh	75	3	1.7	1.28
Dried	45	3	5.8	2.61
Dried, *mws*	45	3	18.5	8.32
Kadota, canned	85	3	0.8	0.68
Filberts (hazelnuts)	35	30	3.0	1.05
mws	35	30	10.3	3.60
Fish			0.0	
Flour, buckwheat	115	1 c.	0.4	0.46
Rye	100	1 c.	0.4	0.40
Soybean	100	1¼ c. sc	3.7	3.70
White	100	¾ c.	0.7	0.70
Force, whole wheat flakes	30	1 c.	1.2	0.36
French dressing, com.	11	2 t.	0.3	0.03
Fruit salad, canned	140	1 c.	0.4	0.56
mws	140	1 c.	1.1	1.54
Gelatin			0.0	
Ginger, crystallized	10	1 sm. piece	0.7	0.07
Gingerbread	60	1 sq.	0.1	0.06
Gooseberries	100	⅔ c.	2.5	2.50
Ripe, *mws*	100	⅔ c.	3.5	3.50
Canned	120	½ c.	1.5	1.80
Grapefruit	100	½, 4″ diam	0.3	0.30
Canned	135	¾ c.	0.2	0.27
Grape-Nuts	30	¼ c.	2.4	0.72
Grapes, American types (slip skin)	100	24	0.5	0.50
European types (adherent skin)	100	15 lg.	0.5	0.50
Thompson seedless, canned	120	½ c.	0.2	0.24
Greengage plums, *mws*	50	3 med	2.6	1.30
Guavas, common	15	1 sm	5.5	0.83
Hazelnuts (filberts)	35	30	3.0	1.05
mws	35	30	10.3	3.60
Hickory nuts	35	¼ c.	2.0	0.70
Hominy grits	20	½ c.*	0.7	0.14
Cooked or canned	100	½ c.	0.1	0.10
Honey			0.0	
Honeydew melon	240	¼ c. diced	0.5	1.20
Horseradish, prepared	10	1 t.	1.0	0.10
Horseradish roots	5	½ t.	2.4	0.12
mws	5	½ t.	8.3	0.41
Huckleberries	100	⅔ c.	1.2	1.20
Jams and preserves, com.	25	1 T	0.6	0.15
Home-cooked	25	1 T.	1.2	0.30
Jellies			0.0	
Kale, leaves	75	½ c.*	1.2	0.90
Kohlrabi	75	½ c.*	1.1	0.76
Krumbles	30	½ c.	1.9	0.57
Kumquats	50	3 med.	3.7	1.85
Lamb stew, canned	115	¼ lb.	0.4	0.46

	Size of portion.		Fiber.	
Food items.	*Grams.*	*Household measures.*	*Per cent.*	*Grams per portion.*
Lambsquarters	75	1½ c.	2.6	1.95
Leeks, bulbs and leaves	55	½ c.	1.3	0.72
Boiled, *mws*	75	½ c.	3.9	2.92
Lemons, whole, *mws*	..		5.2	
Lemon juice, *mws*	..		0.0	
Lentils	60	¼ c.	3.0	1.80
Boiled, *mws*	250	1 c.	2.4	6.00
Lettuce‡	50	1 lg. leaf	0.6 (12)	0.30
mws	50	1 lg. leaf	1.4	0.70
Litchi "nuts"	25	10	3.2	0.80
Loganberries	75	⅔ c.	1.4	1.05
mws	75	⅔ c.	6.2	4.65
Canned	120	⅔ c.	2.0	2.40
Loquats	25	1 med.	0.5	0.12
Macadamia nuts	30	14	2.5	0.75
Macaroni	25	½ c.*	0.4	0.10
Boiled	240	1 c.	0.1	0.24
Macaroons	40	1 lg.	1.1	0.44
Malt Breakfast Food	30	¼ c.	1.5	0.45
Malted milk	8	1 T.	0.3	0.02
Mangoes	160	1 sm.	1.0	1.60
Meat	..		0.0	
Melba toast	20	2, 4″ sq.	0.4	0.08
Mellin's Food	15	2 T.	0.2	0.03
Melotose	9	1 T.	1.0	0.09
Milk	..		0.0	
Molasses	..		0.0	
Mushrooms	50	⅓ c.*	0.9	0.45
mws	50	⅓ c.*	2.5	1.25
Buttons, canned	50	⅓ c.	0.7	0.35
Slices, canned	50	⅓ c.	0.7	0.35
Stems and pieces	50	⅓ c.	2.9	1.45
Muskmelons, av.	100	¼, 5″ diam.	0.7	0.70
Mustard and cress, *mws*	20	½ c.	3.7	0.74
Mustard greens	75	½ c.*	0.8	0.60
Nectarines	100	1 med.	0.4	0.40
mws	100	1 med.	2.4	2.40
Nestlé's Food	8	1 T.	0.9	0.07
Noodles	25	½ c.*	0.4	0.10
Oatmeal, strained, Beech-Nut	25	5 t.	0.2	0.05
Oats, rolled	20	½ c.*	0.9	0.18
Oils	..		0.0	
Okra	50	7, 2½″ pods	1.0	0.50
Olives, green, brined	14	3	1.2	0.17
Ripe, brined, med.	14	3	1.8	0.25
Mammoth	15	2	2.6	0.39
Onions	75	½ c.*	0.8	0.60
mws	75	½ c.	1.3	0.97
Young, green	25	5 sm.	1.8	0.45
Young, green, *mws*	25	5 sm.	3.1	0.77
Oranges	100	1 sm.	0.6	0.60
mws	100	1 sm.	2.0	2.00
Canned	135	¾ c.	0.5	0.67
Orange juice, *mws*			0.0	
Pablum	5	2 T.	0.9	0.05
Papaya	120	$\frac{1}{10}$ av.	0.9	1.08
Parsley	1	1 t.	1.8	0.02
Parsnips	75	½ c.*	2.2	1.65
mws	75	½ c.*	4.0	3.00
Boiled, *mws*	75	½ c.*	2.5	1.87
Passion fruit, *mws*	100		15.9	15.90
Peaches	100	1 sm.	0.6	0.60
mws	100	1 sm.	1.4	1.40
Yellow cling, canned	140	2 halves	0.3	0.42

Food items.	Size of portion. Grams.	Size of portion. Household measures.	Fiber. Per cent.	Fiber. Grams per portion
Peaches				
Strained, canned	15	1 T.	0.5	0.07
Dried	50	3 med.	3.5	1.75
Dried, *mws*	50	3 med.	14.3	7.15
Peanuts	60	30	2.4	1.44
mws	60	30	9.4	5.64
Peanut butter	15	1 T.	2.2	0.33
Peanut butter‡	15	1 T.	1.3 (12)	0.20
Pears	150	1, 3″ long	1.4	2.10
mws	150	1, 3″ long	2.5	3.75
Bartlett, canned	100	2 halves	0.6	0.60
Dried	75	4 halves	6.1	4.58
Peas, green	75	½ c.*	2.2	1.65
Green, *mws*	75	½ c.	5.2	3.90
Green, boiled, *mws*	75	½ c.	5.2	3.90
Young, canned	70	½ c.	1.0	0.70
Canned, *mws*	70	½ c.	4.4	3.08
Strained, canned	25	5 t.	0.7	0.17
Dried, boiled, *mws*	70	½ c.	4.8	3.36
Dried, split	50	¼ c.	1.2	0.60
Peas and carrots, canned	75	½ c.	1.2	0.90
Pecans	25	6	2.2	0.55
Peppers, green	25	3″ piece	1.4	0.35
Red	25	3″ piece	1.6	0.40
Persimmons	50	1 sm	1.5	0.75
Pettijohn's	20	2 T.	2.2	0.44
Pickles, cucumber	20	1 T. (chopped)	0.4	0.08
Pimentos, canned	11	1 t.	0.6	0.06
Pineapple	75	½ c. diced	0.4	0.30
mws	75	½ c. diced	1.2	9.00
Candied	50	1 slice	0.8	0.40
Crushed, canned	75	½ c.	0.4	0.30
Sliced, canned	75	1 sl.	0.3	0.23
Tidbits, canned	75	½ c.	0.2	0.15
Pineapple rice pudding, Heinz	60	2 oz.	0.3	0.18
Pine nuts (pignolias)	10	1 T.	1.0	0.10
Pistachios	20	¼ c.	2.5	0.50
Plums	50	2, 2½″ long	0.5	0.25
mws	100	4	2.1	2.10
Popcorn, popped	15	1 c.	1.7	0.25
Potatoes, sweet	100	1 med.	1.0	1.00
Sweet, boiled, *mws*	100	1 med.	2.3	2.30
White	100	1 med.	0.4	0.40
White‡	100	1 med.	0.5 (11)	0.50
White, new, boiled, *mws*	100	3 med.	2.0	2.00
White, old, boiled, *mws*	100	1 med.	1.0	1.00
Poultry			0.0	
Pretzels	25	6 med.	0.3	0.08
Prune pudding, Heinz	60	2 oz.	1.2	0.07
Prunes, fresh	100	4 med.	0.5	0.50
Canned	100	3 med.	0.3	0.30
Strained, canned	15	1 T.	0.7	0.10
Dried	50	4 lg.	1.6	0.80
Dried, *mws*	50	4 lg.	16.1	8.05
Puffed Rice	15	1 c.	0.5	0.08
Puffed Wheat	15	1 c.	1.6	0.24
Pumpkin	100	½ c.	1.3	1.30
mws	100	½ c.	0.5	0.50
Canned	125	½ c.	1.2	1.50
Radishes	50	6 med	0.7	0.35
mws	50	6 med	1.0	0.50
Raisins	60	⅓ c.	1.7	1.02
mws	60	⅓ c	6.8	4.08

Food items.	*Size of portion.*		*Fiber.*	
	Grams.	*Household measures.*	*Per cent*	*Grams per portion*
Raspberries, black	75	½ c.	3.5	2.62
Red	75	½ c.	2.8	2.10
Canned, water pack	100	½ c.	2.5	2.50
Canned, heavy syrup	140	½ c.	1.9	2.66
Rhubarb	100	⅔ c.	0.7	0.70
mws	100	⅔ c.	2.6	2.60
Rice, natural brown	20	1 heaping T.	0.9	0.18
White	20	1 heaping T.	0.3	0.06
White, boiled	100	½ c.	0.1	0.10
Wild Indian	20	⅙ c.	1.4	0.28
Rice bran	3	1 T.	10.7	0.32
Rice Flakes	30	1 c.	0.7	0.21
Rusk, white flour	15	1	0.2	0.03
Whole wheat	15	1	1.9	0.29
Rutabagas	50	½ c.*	1.3	0.65
Ry-Krisp	6	1	1.3	0.08
Salsify	100	2, 6″ long	1.8	1.80
Sauerkraut	80	½ c.	1.0	0.80
Savoy cabbage, boiled, *mws*	100	½ c.	2.5	2.50
Seakale	100	1½ c.	0.8	0.80
Shredded Wheat	30	1 biscuit	2.6	0.78
Shredded Wheat‡	30	1 biscuit	5.9 (13)	1.77
Sobee, Mead	5	1 T.	1.4	0.07
Sorrel or dock	25	½ c.	0.8	0.20
Soups:				
Clear	...		0.0	
Cream of vegetable	250	1 c.	0.1	0.25
Soybean curd or cheese	100		0.1	0.10
Spaghetti	25	½ c.*	0.4	0.10
Spanish melon	240	¾ c. diced	0.5	1.20
mws	240	¾ c. diced	0.9	2.16
Spinach	75	½ c.*	0.7	0.53
Spinach‡	75	½ c.	0.5 (23)	0.38
Boiled, *mws*	75	½ c.	6.3	4.72
Chopped, Heinz	30	1 oz.	0.7	0.21
Strained, canned	25	5 t.	0.7	0.18
Spring greens, boiled, *mws*	75	½ c.	3.8	2.85
Squash, summer	100	½, 5″	0.5	0.50
Winter	100	2 x 2 x 1″	1.4	1.40
Starches	8	1 T.	0.1	0.01
Strawberries	100	¾ c.	1.2	1.20
mws	100	¾ c.	2.2	2.20
Swedes, boiled, *mws*	50	½ c.*	2.8	1.40
Syrups			0.0	
Tangerines	100	2, 2″ diam.	1.0	1.00
mws	100	2, 2″ diam.	1.9	1.90
Tapioca	40	¼ c.	0.1	0.04
Thousand Island Dressing, com.	20	1 T.	0.6	0.12
Tomato juice‡	120	½ c.	0.1 (7)	0.12
Tomato paste, canned	30	1 oz.	0.9	0.27
Tomatoes	100	1 sm.	0.6	0.60
mws	100	1 sm.	1.5	1.50
Strained, canned	25	5 t.	0.4	0.10
Turnips	50	½ c.*	1.1	0.55
mws	50	½ c.*	2.8	1.40
Boiled, *mws*	50	½ c.*	2.2	1.10
Turnip tops	100	1 c.	1.2	1.20
Boiled, *mws*	100	1 c.	3.9	3.90
Vegetable marrow, boiled, *mws*	100	½ c.	0.6	0.60
Vegetable mixture, canned	80	½ c.	0.7	0.56
Vegetable soup	250	1 c.	0.5	1.25

Food items.	Size of portion. Grams.	Household measures.	Fiber. Per cent.	Grams per portion.
Vegetables, green, creamed, Heinz	80	½ c.	0.9	0.72
mixed, chopped, Heinz	80	½ c.	0.5	0.40
Vitab	8	1 T.	0.7	0.06
Walnuts, black	35	6	1.9	0.66
English	35	6	2.1	0.73
English, *mws*	35	6	22.6	7.91
Watercress	20	½ c.	0.5	0.10
mws	20	½ c.	3.3	0.66
Watermelon	240	1 c. diced	0.6	1.44
Wheat Flakes	30	¾ c.	1.8	0.54
Wheat-germ	9	1 heaping T.	2.5	0.23
Wheat, whole	75	½ c.	1.8	1.35
Wheatena	20	½ c.*	0.6	0.12
Wheaties	35	1 c.	1.8	0.63
Yams	125	1 med.	0.8	1.00
Yautia	100	1 tuber	0.6	0.60
Zwieback	7	1 piece	0.3	0.02
Yeast, brewer's	11	2 t.	0.8	0.09
Compressed	15	1 square	0.3	0.05

II. THE PROTEIN GROUP

Properties.—Proteins are the most important of the foodstuffs. Certain animals can subsist on a protein diet, forming from the protein such fat and carbohydrate as they require. The chemical instability and complexity of the proteins are essential for the phenomena of life, since protoplasm is fabricated from these compounds. The proteins differ from the fats and carbohydrates in that they contain nitrogen in amounts varying from 15 to 17.6 per cent. The vegetable proteins contain slightly more, the animal proteins slightly less than the average 16 per cent. Sulphur (0.3 to 2.4 per cent) is usually found in the protein molecule and occasionally phosphorus (0.4 to 0.8 per cent). In 100 grams of mixed protein an average of 1 gram of combined sulphur will be found. Other elements, such as iron and iodine, though rarely exceeding 1 per cent, occur in specialized porteins.

The classification given here is deliberately incomplete since the properties which separate the proteins are of little consequence to anyone but the analyst. Proteins fall into several groups on the basis of solubility regardless of whether they be classed as simple or conjugated. Therefore, one should not be dismayed if a conjugated protein is listed also with the simple ones. Ovovitellin, a phosphoprotein, possesses the properties of a globulin. Likewise, ovalbumin is listed as simple, yet there is evidence that it is a glycoprotein. A classification should be useful even if it cannot be consistent.

Classification of Proteins

Type	*Illustrative Occurrence*
I. Simple Proteins	
1. Albumins	Ovalbumin (hen's egg), serum albumin, lactalbumin (milk)
2. Globulins	Serumglobulin, fibrinogen, legumin (peas), tuberin (potatoes)
3. Glutelins	Glutelin (corn), glutenin (wheat)
4. Histones	Globin (hemoglobin)
5. Prolamines	Gliadin (wheat), hordein (barley), zein (corn)
6. Protamines	Salmine (salmon spermatozoa)
7. Albuminoids	Keratin (hair), elastin, collagen (tendons, ligaments)
II. Conjugated Proteins	
1. Nucleoproteins	Protein (generally histone or protamine) linked with nucleic acid
2. Glycoproteins	Protein (other than nucleoprotein) combined with carbohydrate; mucin (saliva), ovomucoid* (egg-white)
3. Lecithoproteins	Protein linked to lecithin, presumed to exist in blood serum and elsewhere
4. Phosphoproteins	Protein linked with phosphorus other than found in lecitho- and nucleo-protein; casein (milk, cheese), ovovitellin (egg-yolk), phosvitin (new type of protein derived from egg-yolk, especially rich in phosphorus as phosphate)
5. Chromoproteins	Protein combined with a pigment, forming a colored substance; hemoglobin
III. Derived Proteins	
1. Primary Protein Derivatives (a) Proteans (b) Metaproteins (c) Coagulated proteins	Mild changes resulting in denatured proteins, as in cooking or exposure to weak acid
2. Secondary Protein Derivatives (a) Proteoses (b) Peptones (c) Polypeptides	Products of protein hydrolysis or digestion

* Selectively inhibits trypsin activity.

It is estimated that 1600 different proteins exist in the human body yet their total weight averages only 11 kilograms per person (about 56 per cent of body weight excluding water). These are composed of comparatively few amino acids, designated as "alpha" since the NH_2 group is located on the carbon next to the carboxyl

(COOH). These acids combine with each other at the amino and carboxyl groups to give the peptide linkage,

$$\begin{array}{c} -\mathrm{C}-\mathrm{N}- \\ | \\ \mathrm{OH} \end{array} \quad \leftrightarrows \quad \begin{array}{c} -\mathrm{C}=\mathrm{N}- \\ | \\ \mathrm{OH} \end{array}$$

The conventional way of writing glycine is $NH_2.CH_2.COOH$, but the zwitterion formula ($NH_3^+.CH_2.COO^-$) emphasizes the basic and acid properties of the amino acid.

It is generally agreed that the diet furnishes 20 amino acids which are placed in two groups based on their effects upon growth:

Dispensable	*Indispensable*
Alanine	Arginine*
Aspartic acid	Histidine*
Cysteine	Isoleucine
Cystine	Leucine
Glutamic acid	Lysine
Glycine	Methionine
Hydroxyproline	Phenylalanine
Proline	Threonine
Serine	Tryptophan
Tryosine	Valine

* Not needed in human adult if sufficient of the others.

This listing is not to be taken literally. Too great emphasis is placed upon the "essential" amino acids as though they alone were desirable in the diet. However, for those who must recall the list, the initial letter of the following may help jog the memory: A Handy Inclusive Little List Must Promise Ten Truly Vital. The requirement, indeed, is more critical for some amino acids than for others but the human race would do well to continue consumption of all these protein-builders. It should be recognized that the "essential" list varies from species to species, from growing organism to adult, and circumstance to circumstance. The presence or absence of other amino acids, to say nothing about additional limiting factors, can markedly affect the need for any one acid.

Listings of amino acids vary from 20 to 23. Iodogorgoic acid (di-iodotyrosine or thyroxine) as the active principle of the thyroid gland is often included although ornithine and citrulline, intermediary products in the conversion of arginine to urea, generally are not. Hydroxyglutamic acid and norleucine should be left out as their original acceptance was erroneous. The structure of homocystine is similar to methionine except that it lacks the terminal methyl group of the latter.

Alanine

$CH_3.CH.COOH$
$\quad | $
$\quad NH_2$

Arginine

$NH.(CH_2)_3.CH.COOH$
$C{=}NH \quad NH_2$
NH_2

Aspartic Acid

$CH_2.COOH$
$CH.COOH$
NH_2

Cysteine

$H_2C.SH$
$CH.NH_2$
$COOH$

Cystine

$CH_2S \text{——} S.CH_2$
$CH.NH_2 \quad CH.NH_2$
$COOH \quad COOH$

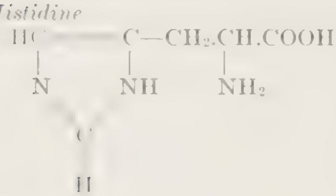
Glutamic Acid

$H_2N.CH.COOH$
CH_2
$CH_2.COOH$

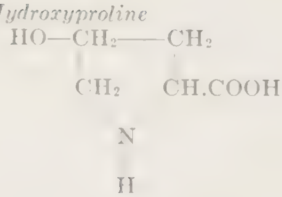
Glycine

$CH_2.(NH_2).COOH$

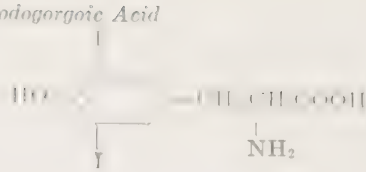
Histidine



Hydroxyproline



Iodogorgoic Acid



Isoleucine

CH_3
$CH.CH.COOH$
$CH_3.CH_2 \quad NH_2$

Leucine

CH_3
$CH.CH_2.CH.COOH$
$CH_3 \quad NH_2$

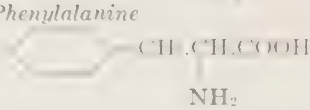
Lysine

$CH_2.(CH_2)_3.CH.COOH$
$NH_2 \quad NH_2$

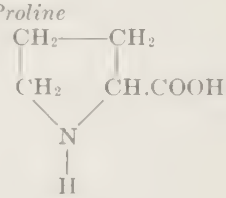
Methionine

$CH_3.S.CH_2.CH_2.CH.COOH$
NH_2

Phenylalanine



Proline



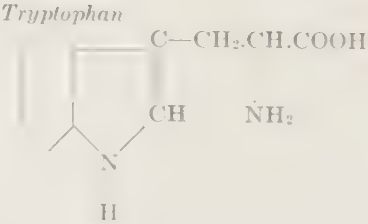
Serine

$CH_2.CH.COOH$
$OH \quad NH_2$

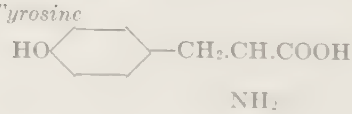
Threonine

$CH_3.CH \quad CH.COOH$
$OH \quad NH_2$

Tryptophan



Tyrosine



Valine

CH_3
$CH.CH.COOH$
$CH_3 \quad NH_2$

Evaluation of Proteins.—The rating of protein is dependent upon the kind and quantity of amino acids composing it. A protein is judged by the ease with which it sustains growth and maintains nitrogen equilibrium in the adult. Nitrogen equilibrium is achieved when the intake and output are balanced. Retention of nitrogen (positive balance) occurs during growth, pregnancy, and convalescence. Negative balance is encountered in wasting diseases or inadequate protein consumption.

Proteins from animal sources readily provide a suitable selection of amino acids for building human tissue. Plant sources are considerably less efficient. The *coefficient of digestibility* for protein concerns itself with the percentage of the nitrogen intake which is absorbed. This has nothing to do with the popular concept of digestibility as measured by freedom of undesirable symptoms. Animal proteins have the highest coefficient of digestibility, rating 95-100 per cent. In general, the cereals tend to give values around 85 per cent but when the coarser material is removed, the coefficient will rise to 90-100 per cent. Fruits and vegetables may rate 80-85 per cent, but can be lower. Proteins in nuts show a low coefficient, around 70 per cent.

The *biological value* of a protein is concerned with the percentage of the absorbed nitrogen which is retained in the body. This has a quantitative aspect as well as qualitative. It takes a large amount of an inferior protein to equal a small amount of a superior protein. The biological value is an index of the ability of a given protein to meet growth requirements. The figures, however, should not be taken too literally as experimental results can vary widely with conditions.

One of the limiting factors in estimating biological value is the rate of release of amino acids to the body. The essential amino acids must be available in suitable quantities when and where needed. Soybean protein shows no change in amino acid composition or in degree of digestibility before and after various types of processing but exhibits marked differences in biological values. The limiting amino acid in soy protein is methionine, and suitable heating under pressure increases availability of this amino acid. In other words, it is the rate rather than extent of methionine liberation which determines the biological value of soy protein (Melnick *et al.*, 1946). During digestion of raw soy meal, methionine is set free very slowly in comparison with leucine; lysine is still more rapidly liberated. Heat processing increases the rate of liberation of methionine to a relatively greater extent. It is also recognized that soybeans contain a trypsin inhibitor which must be destroyed by thorough heating; otherwise, no protein present can be used to advantage. Cooking can be credited not only with increasing digestibility of foods by rendering them more accessible to enzyme attack but also, in special instances, with destruction of agents having a deleterious affect upon the digestive process.

Considerable attention is being given to the matter of availability of amino acids. For example, when fish or soybean meal is included in diets adequate in all nutrients except tryptophan, the tryptophan in these products is not completely utilized for growth by chicks (Schweigert, 1949). Similarly, the availability of arginine from cottonseed flour has been shown to be 93.4 per cent while the lysine availability was only 64.5 per cent; these values approached 100 per cent when meat protein was fed (Kuiken and Lyman, 1948).

In practice, biological need is met by food furnished at stated intervals. Variable findings result from differences in timing and combinations of the same foods. If one or more essential amino acids are inadequate in supply at the time of need, others fail to be used. Simultaneous intake of several proteins, each inadequate in itself, may furnish the body with a quota of essential amino acids and thus lead to utilization of all. Gelatin, with a biological value of zero, contains a generous amount of lysine in which cereal and vegetable proteins are notably low. Gelatin, then, will enhance the value of such foods. Similarly, the proteins of milk supplement the cereals and raise the value of their proteins but a glass of milk at supper will not correct deficiency at breakfast.

If certain amino acids are missing, no amount of others will suffice. Since the tissue proteins undergo constant chemical change with considerable re-arranging of amino acids, the body can sometimes draw upon special tissues rich in the missing factor and so preserve the general metabolism for a time at the expense of some less vital function.

The so-called non-essential amino acids are needed by the body but can be synthesized if suitable precursors are available. Cystine is classed as dispensable although the body requires it. To take a specific example, insulin is rich in cystine, devoid of methionine; it also has an abundant tyrosine content, but no tryptophan. If cystine is not furnished in the diet, then there must be enough methionine to meet the demands for this amino acid (which functions as a methyl donor, among other things) and provide a surplus for conversion into cystine. Cystine, then, can be substituted for the essential methionine to the extent of its own need. On the other hand, homocystine can be converted into methionine if other methyl donors are supplied and thus it can substitute in part for the essential amino acid. Again, more phenylalanine is necessary if no tyrosine is available. Tyrosine is "non-essential," yet without it no thyroxine can be produced. The effect of arginine upon growth of rats is enhanced by the "dispensable" glutamic acid. It is apparent that the quantity of each amino acid required, regardless of its category, depends upon what else is present. Undoubtedly some of the essential amino acids can be synthesized in the body but presumably not fast enough to keep up with demand. It is probable that under stress in both adult and young the demand for some of the amino acids is raised.

Certainly the non-essential amino acids cannot be manufactured in the body unless the NH_2 group is supplied. The classical biochemical point of view visualized the ammonia released from amino acids as a waste product to be excreted in the urine as urea. It is now realized that this nitrogen is employed for synthetic purposes. In studies governing amino acid requirements nitrogen may be supplied in the form of glycine and urea.

Biological Classification of Proteins

I. Adequate for Growth and Maintenance (complete proteins)
    A. In Relatively Small Amounts
        1. Lactalbumin (milk)
        2. Ovalbumin (egg-white)
        3. Ovovitellin (egg-yolk)
    B. In Relatively Large Amounts
        1. Meat proteins
            (a) Albumin
            (b) Myosin
        2. Glutenin (wheat)
        3. Casein (milk)
        4. Glutelin (corn)
        5. Glycinin (soybeans)
II. Inadequate for Growth (incomplete proteins)
    A. Adequate for Maintenance
        1. Gliadin (wheat, rye)
        2. Hordein (barley)
        3. Legumin (peas)
        4. Legumelin (soybeans)
        5. Phaseolin (kidney and navy beans)
    B. Inadequate for Maintenance
        1. Gelatin
        2. Zein (corn)

Requirement. The minimum subsistence requirement *per diem* lies between 0.5 and 0.7 gram of selected proteins per kilogram of body weight. It is probably safer to regard 1 gram as a minimum because of the inadequacy of certain proteins and the unassimilable nature of part of the food nitrogen. Bed-ridden patients need less than 1 gram of protein per kilogram. If low-protein diets are indicated, two-thirds of the nitrogen should be in the form of animal proteins. According to Sherman, cereal proteins are as efficient as meat proteins, provided milk is included in the dietary. In general, vegetable proteins lack the availability of animal proteins. During the period of active growth, the protein allowance should be 2 to 4 grams per kilogram per day.

Nitrogen equilibrium can be achieved on a much lower protein intake by choosing superior sources. Adjustment to a poor assortment of amino acids is possible within narrow limits by eating more of the inferior protein, but this results in squandering much of the amino-acid intake. A generous allowance of high-grade protein is associated with physical fitness and vigor, as well as increased resistance to disease.

The quantity of protein required depends also on the amounts of carbohydrate and fat simultaneously available. On protein alone, positive nitrogen balance is not reached as the human body cannot handle enough of this food-stuff to satisfy caloric needs. Even with addition of fat, positive balance is not secured until a minimum of carbohydrate is introduced. Positive balance can be obtained on low-protein intake plus an adequate supply of carbohydrate and fat. The body demands glucose at all times regardless of the cost. If both protein and caloric intake are to be limited, skill is necessary in computing a diet which is physiologically satisfactory.

Nothing herein is to be construed as suggesting that mankind cannot live on an exclusive meat and fish diet since it is being done. These foods, of course, are not pure protein. However, it is difficult to shift from a mixed diet to an exclusive lean meat intake without untoward symptoms as the fat:protein ratio requires some adjustment.

Table 27 A gives tentative data on amino acid requirements of the normal adult human male. In line with these values it may be suggested that the minimum daily need for arginine, histidine, and tyrosine is 1.2, 0.5, and 1.0 gram respectively. In the rat, exclusion of any one of the ten essential amino acids, except arginine, leads to profound nutritional failure, loss in weight, diminished appetite and eventual death. Arginine deprivation merely decreases rate of gain suggesting capacity for partial synthesis. Histidine and arginine are not needed by the adult man; whether this is true of the growing child remains to be seen. Experimentally, use of amino acids in lieu of natural protein in the human diet raises the requirement for calories considerably above that assumed to be sufficient for nitrogen balance, maintenance of weight and avoidance of hunger. Explicitly, where 40 calories per kilogram were deemed sufficient, 55 or more had to be furnished.

TABLE 27 A.—**Minimum and Recommended Amino Acid Intake for Normal, Adult Man.***

Amino Acid	*Minimum (Grams)*	*Recommended (Grams)*
l–Isoleucine	0.70	1.4
l–Leucine	1.10	2.2
l–Lysine	0.80	1.6
l–Methionine	1.10	2.2
l–Phenylalanine	1.10	2.2
l–Threonine	0.50	1.0
l–Tryptophan	0.25	0.5
l–Valine	0.80	1.6

* From W. C. Rose, Fed. Proc. **8**, 546, 1949; these values are strictly tentative and it is assumed that sufficient nitrogen is available for synthesis of all non-essential amino acids.

Tables 27 B and 27 C present data on the amino acid content of a few foods in terms of their percentage in crude protein, computed at 16 per cent N. Knowing the protein content, the percentage of

each amino acid in the food itself can be calculated and from this the amount present in an average serving. These tables give only the range reported whereas the original paper provides separate analyses and a reference for each.

TABLE 27B.—**Amino Acid Content of Foods.***

Per Cent of Crude Protein

Amino Acid	*Beef Muscle*	*Beef Liver*	*Milk***	*Whole Egg*
Arginine	6 0–6.8	3.4	3.5–3.6	
Histidine	2.0–4.0	1.9–2.6	2.3–2.5	2.3
Isoleucine	5 3–5 9	4 0–5.6	5 2–6 5	
Leucine	7 7–8 4	8 3–8.4	9.7–11 8	
Lysine	7.9–10 0	6.1–7.0	7.1–8.7	7 8
Methionine	2.2–2 8	2 0–2.3	2.1–2.2	2.7
Phenylalanine	3.7–4.1	4.3–5.3	4 5–5 3	
Threonine	3.7–5 8	3 8–4.5	3 7–5 2	5 8
Tryptophan	1.1–1.3	1 4–1.6	1.3–1 4	
Valine	5.1–5.9	5.7–6.2	6 2–7 9	6.9

TABLE 27C.—**Amino Acid Content of Foods.***

Amino Acid	*Soybean Meal*	*Peas*	*Whole Wheat*	*Whole Corn*
Arginine	7.1–7 3	5.4–8 9	4.1–4.2	4 3
Histidine	2.1–2 5	1.2–2.9	1.4–2.0	2.2–2 4
Isoleucine	4 5–5.6	4.1–5 2	3.6–3 8	4 1
Leucine	7.1–7.9	6.4–6 9	5 6–6 8	9 6
Lysine	5.4–6.2	5.0–6 5	2 0–2 9	2 3
Methionine	0 8–1 8	0.4–1.0	1 0–1.2	1 4
Phenylalanine	4.5–5 3	4.4–5.0	4.4–5.1	4 3
Threonine	3 3–4.1	3.9–4.2	2.1–3.0	3.1–3.9
Tryptophan	1.2–1.6	0.7–0.9	1.0–1.4	
Valine	4.6–5.1	4.0–5.4	4.1–4.8	5 2–5.3

* From Schweigert, B. S., J. Am. Dietet. Assn. **24**, 939, 1948.
** Values included for whole milk, dried whole, or skim milk.

Sources.—Animal proteins (meat, fish, eggs, cheese, milk) are usually ranked higher than those of plant origin (cereals, nuts, legumes). Neither maximum nor minimum proportions of these two groups have ever been established. Traditional preference and economic necessity have largely determined selection. Until better guidance is available, it is suggested that diets indigenous to the locality be followed, provided they are associated with physical vigor. In temperate climates the cereals usually are not an adequate source of protein unless accompanied by generous amounts of dairy products. Booher (1940) recommends that the average adult select his protein in equal quantity from animal and vegetable sources.

As stressed by Nixon (1938) potatoes are a better crop than wheat from the economic standpoint, since an acre planted with the former will feed twice as many people as one planted with the latter. Although the potato is predominantly a carbohydrate food, tuberin (a globulin) is ranked as a protein superior to those found in the

cereals. A liberal amount of potatoes in the diet is preferable to its equivalent in cereals.

The legumes or pulses generally furnish the cheapest source of protein. Although laborers may digest a pound of baked beans per day without discomfort, persons of sedentary habits cannot handle large quantities of leguminous foods (Bailey, 1928). Experiments of many different investigators show that the protein of the soy bean, unlike that of other leguminous seeds thus far studied, is adequate for promoting a normal growth; in other words, the protein of the soy bean is comparable to the perfect protein of milk or meat.

Putrefaction. Proteins are highly perishable, both chemical and biological breakdown occurring. Living organisms are used in preparation of many delectable foods but they can also be detrimental. Poisoning can occur through production of toxins or multiplication of pathogens capable of infecting the intestinal tract. Food-borne poisoning is beyond the scope of this book but a word of caution is in order regarding ptomaines, products obtained from amino acids by removal of the acid group, leaving an amine. Formerly it was thought that protein decomposed to give these amines and that *they* were responsible for the symptoms of "ptomaine poisoning." This term is antiquated and wholly inaccurate since poisoning is due to staphylococcus toxin, streptococcus infection, salmonella infestation, etc. When protein putrefies it becomes unpalatable to some although quite acceptable to others. One should hesitate to say that it becomes less nutritious except when furnished with recent experimental evidence. Certainly it is scarcely toxic as compared to the effect of the pathogens listed. One is generally safe in rejecting food showing evidence of decomposition as it is quite likely that noxious organisms are also present. Concepts of intestinal putrefaction commonly held are fertile ground for the operation of faddists. The whole subject will undoubtedly be reopened as advances are made in comprehending the synthesis of certain B vitamins in the intestinal tract.

Nucleoproteins

The characteristic non-protein groups of nucleoproteins are the nucleic acids. These contain purins (as adenine) pyrimidines (as thymine), phosphoric acid and a pentose as the building unit. One such unit is *adenylic acid*. Removal of the phosphoric acid leaves *adenosine*. These terms should be familiar as they appear in discussions of energy release, enzyme systems and vitamin function (see p. 288).

Purins

Foods which contain nucleic acid (and hence the purin ring) are designated as purin foods. The end-product of purin metabolism is uric acid. All animal foods except milk, cheese, and fresh eggs

contain purins. Glandular organs and meat extracts show the highest concentration. In Table 28 A no uric acid equivalent for purin N is shown for items containing methylated purins since only a trace of purin occurs in the beverage infusion. Although it is doubted that the methylated purins contribute significantly to the urinary uric acid, it is recognized that both caffeine (coffee) and theophylline (tea) can be converted into uric acid in the body. Possibly their stimulating effect leads to a greater uric acid output from other sources. The theobromine of cocoa and chocolate does not form uric acid.

Purins are, of course, essential constituents of muscular tissue, glandular organs, genes, chromosomes and other nuclear structures. They can be synthesized in both young and old, the chief precursor being histidine. Consumption of histidine-rich foods markedly raises uric acid excretion and its withdrawal from the diet lowers the urinary output.

While lowered intake of purin-rich foods reduces blood uric acid, kidney efficiency being normal, the ingestion of non-purin protein sources accomplishes the same thing. Carbohydrate likewise lowers blood uric acid and increases urinary output, but starvation or increased fat intake raises the blood level and diminishes the excretion.

Purin analyses are shown in two separate tables, 28 A presenting older data which do not necessarily agree with the newer figures of Table 28 B from McCance and Widdowson ("Chemical Composition of Foods," Medical Research Council, 1940).

The only analyses of these investigators which appear in Table 28 A are those for coffee and tea which are designated (*mw*). Fish roe has been reported as containing no purin nitrogen but McCance and Widdowson found high concentrations.

TABLE 28 A.—**Purin Content of Various Foods.**

Food items.	*Purin N, mg. per cent.*	[illegible] *as uric acid mg. per cent*
Anchovies	145.0	465.0
Apricots	None	
Apples	None	
Arrowroot	None	
Asparagus, cooked	8.6	25.8
Bananas	None	
Barley	None	
Beans	25.0	75.0
Beef, muscle	60.0	180.0
Pancreas	183.0	549.0
Ribs	45.5	136.5
Sirloin	52.2	156.6
Steak	82.6	247.8
Beer, Lager	5.0	15.0
Pale ale	5.9	17.7
Porter	6.0	18.0
Blueberries	None	
Bouillon	10.0	30 0
Bread, white	None	
Butter	None	
Cabbage	None	
Calves' liver	120.0	360.0
Calves' spleen	160.0	480.0
Calves' thymus	440.0	1320.0
Carp	60.0	180.0
Carrots	None	
Cauliflower	None	
Caviar	None	
Celery	5.0	15.0
Cheese	None	
Chicken	51.8	155.4
Cod	23.3	69.9
Coffee	29.4	
Coffee, ground, roasted (*mw*)	38.0	
Coffee, infusion (*mw*)	Trace	
Corn	None	
Crab	20.0	60.0
Cucumbers	None	
Eel, smoked	27.0	81.0
Eggs, fresh	None	
Farina	None	
Filberts	None	
Flour, white	None	
Fruits	None	
Gelatin	None	
Goose	33.0	99.0
Grapes	None	

Food items.	*Purin N, mg. per cent.*	*Calculated as uric acid, mg. per cent.*
Halibut	40.8	122.4
Ham	46.2	138.6
Ham, boiled	25.0	75.0
Herring	69.0	207.0
Lentils	25.0	75.0
Lentils, malted	15.0	45.0
Lettuce	None	
Liver, beef	110.0	330.0
Liver, calves'	120.0	360.0
Liverwurst	38.0	114.0
Lobster	22.0	66.0
Milk	None	
Mushrooms	18.0	54.0
Mutton, Australian	38.6	115.8
Oatmeal	None	
Olive oil	None	
Onions	3.1	9.3
Oranges	None	
Oysters	29.0	87.0
Pancreas, beef	183.0	549.0
Pancreas, pig's	123.0	369.0
Peas	18.0	54.0
Peameal	15.6	46.8
Peaches	None	
Pears	None	
Pheasant	34.0	102.0
Pineapple	None	
Pike	45.0	135.0
Plaice	31.8	95.4
Plums	None	
Pork, loin	48.5	145.8
Pork, neck	22.7	68.1
Potatoes	0.8	2.4
Rabbit	38.0	114.0
Radishes	5.0	15.0
Rice, polished	None	
Rolls	None	
Salmon	46.6	139.8
Sardines in oil	116.7	350.0
Shell beans	27.0	81.0
Spinach	26.6	80.0
Squab	58.0	174.0
String beans	2.0	6.0
Sweetbreads*	330.0	990.0
Tapioca	None	
Tea, Ceylon	16.4	
Tea, China	10.7	

* Thyroid glands are frequently sold as sweetbreads.

Food items.	Purin N, mg. per cent.	Calculated, as uric acid mg. per cent
Tea, Indian	14.7	
Tea, Indian (*mw*)	72.0	
Tea, infusion (*mw*)	Trace	
Thymus, beef	402.5	1207.5
Thymus, calves'	440.0	1320.0
Tomatoes	None	
Tongue, smoked	55.0	165.0
Tripe	22.9	68.7
Trout	56.0	168.0
Turkey	50.4	151.2
Veal broth	423.3	1270.0
Veal, loin	46.5	139.5
Veal, muscle	60.0	180.0
Venison	39.0	117.0
Walnuts	None	
Wines (Claret, Volnay, Sherry, Port)	None	

TABLE 28 B.—**Purin Content of Cooked Meat and Fish Products.**

Food items.	Purin N, mg. per cent.	Calculated as uric acid, mg. per cent
Bacon, fried	66–86	198–258
Bass, steamed	73	219
Beef, corned, canned	36	108
Beef, sirloin, roasted, lean	60	180
Lean and fat	46	138
Beef, silverside, boiled	55	165
Beef, steak, fried	61	183
Grilled	85	255
Beef, topside, boiled, lean only	72	216
Beef, topside, roasted, lean only	73	219
Lean and fat	66	198
Beef, stewed, lean only	61	183
Beef stew	32	96
Bloaters, grilled	133	399
Bovril	324	972
Brains, calves', boiled	40	120
Brains, sheep, boiled	31	93
Catfish, steamed	60	180
Fried	65	195
Chicken, boiled	61	183
Chicken, roasted	72	216
Cod, steamed	62	186
Cod steaks, fried	63	189
Grilled	82	246
Cod roe, baked in vinegar	130	390
Cod roe, fried	112	336
Crab, boiled	61	183

Food items	Purin N, mg. per cent.	Calculated as uric acid, mg. per cent.
Curried meat	18	54
Duck, roasted	64	192
Eel, stewed	23	69
Fish cakes	36	108
Flounder, steamed	86	258
Fried	61	183
Goose, roasted	100	300
Grouse, roasted	98	294
Guinea-fowl, roasted	142	426
Haddock, fresh, steamed	72	216
Fried	83	249
Haddock, smoked, steamed	65	195
Halibut, steamed	68	204
Hake, fried	52	156
Hake, steamed	42	126
Ham, boiled, lean only	64	192
Lean and fat	45	135
Hare, roasted	99	297
Stewed	60	180
Heart, sheep, roasted	174	522
Herring, baked in vinegar	160	480
Herring, fried	172	516
Herring roe (soft), fried	484	1452
Irish stew	11	33
Kidney, ox, stewed	147	441
Kidney, sheep, fried	137	411
Kippers, baked	91	273
Lard	0	0
Ling, steamed	60	180
Fried	56	168
Liver, Calves', fried	143	429
Liver, ox, fried	143	429
Lobster, boiled	73	219
Mackerel, fried	100	300
Mullet, gray, steamed	73	219
Mullet, red, steamed	81	243
Mussels, boiled	154	462
Mutton chop, fried, lean only	63	189
Mutton chop, fried, lean and fat	40	120
Mutton chop, grilled, lean only	61	183
Mutton chop, grilled, lean and fat	46	138
Mutton, leg, boiled	91	273
Mutton, leg, roasted	77	231
Mutton, scrag and neck, stewed	56	168
Oxo cubes	236	708
Oysters	44	132
Partridge, roasted	145	435

Food items.	*Purin N, mg. per cent.*	*Calculated as uric acid, mg. per cent.*
Pigeon, boiled	83	249
Pigeon, roasted	96	288
Pheasant, roasted	95	285
Plaice, steamed	53	159
Fried	47	141
Pollack, steamed	71	213
Fried	75	225
Pork, leg, roasted	66	198
Pork loin, roasted lean only	64	192
Lean and fat	51	153
Pork loin, smoked, cooked, lean only	50	150
Pork, loin chops, grilled, lean only	68	204
Lean and fat	49	147
Prawns, cooked	70	210
Rabbit, stewed	61	183
Salmon, canned	101	303
Salmon, steamed	78	234
Sardines, canned	234	702
Sausage, black	2	6
Scallops, steamed	117	351
Shepherd's pie	15	45
Shrimps, cooked	72	216
Skate, fried	41	123
Smelts, fried	168	504
Sole, steamed	53	159
Fried	52	156
Sprats, fried	125	375
Sprats, smoked, grilled	250	750
Steak and kidney pie	49	147
Sturgeon, steamed	50	150
Sweetbreads, stewed	426	1278
Tongue, ox, pickled	48	144
Tongue, sheep, stewed	52	156
Tripe, stewed	22	66
Trout, steamed	92	276
Trout, sea, steamed	95	285
Turbot, steamed	64	192
Turkey, roasted	79	237
Veal cutlet, fried	106	318
Veal fillet, roasted	89	267
Vegex (marmite)	356	1068
Venison, roasted	97	291
Whelks, cooked	65	195
Whiting, steamed	90	270
Fried	94	282
Winkles, boiled	70	210

III. THE FAT GROUP.

Fats and related substances, known collectively as the lipoids, are widely distributed in living structures. Tissue fats differ from storage fats in three important particulars: the fatty acids are more unsaturated, they suffer no diminution except in the extremes of starvation, they are linked with cholesterol or phosphoric acid instead of glycerol.

The physiological value of the lipoids depends upon their individual character. Certain of the lipoids are as essential in the structure of protoplasm as the proteins. In these tissue lipoids are found groups containing nitrogen or nitrogen and phosphorus. The cell framework is composed of globulins, nucleoproteins, lecithin and cholesterol. The neutral or true fats are glycerides composed only of carbon, hydrogen and oxygen, in the form of fatty acids linked to glycerol. The neutral fats are heat insulators; they exercise cushioning effect by enveloping vital organs; they are the most compact form of stored energy.

Cholesterol is a lipoid of paramount importance. It is a vital constituent of nerve tissue, and is anti-hemolytic. It checks lipolytic action in the tissue cells, and is responsible in part for the semisolid consistency of living cells despite their large water content. Increase in cholesterol concentration enables cells to hold greater quantities of water, pathologically visible as edema. The metabolism of the fatty acids is inseparably bound with cholesterol and the phosphorized fats which are found in all living cells.

Use of Terms.—The word "fat" can cover the whole group whereas "fats" usually refer to triglycerides. To avoid misunderstanding, the latter often are called "true fats" or neutral fats to distinguish them, in turn, from their fatty acids. Some workers use "lipoid" for the whole group and "lipid" for those containing nitrogen although for clarity these are designated as "phospholipids." Others reverse this use of terms or employ "lipin" in either sense. However, no great amount of confusion exists as most investigators follow a set pattern and the context generally reveals the meaning.

Classification of Lipids (Fatty Materials)

Type	*Components*
I. True Fats and Oils: Triglycerides	Glycerol + 3 fatty acid groups
II. Nitrogen-containing Lipids	
A. With H_3PO_4, phosphorized fats	
1. Phospholipids or phosphatides	
(a) Lecithins	Glycerol + 2 fatty acid-groups + H_3PO_4 + choline
(b) Cephalins	As preceding except cholamine in place of choline
2. Sphingomyelins	Fatty acid + sphingosine + H_3PO_4 + choline
B. With sugar but no P, glycolipids	
1. Cerebrosides	Fatty acid + galactose + sphingosine
2. Gangliosides	Complex

Classification of Lipids (Fatty Materials)

Type	*Components*
III. Waxes	Fatty acid + higher alcohols; cholesterol esters often included here
IV. Steroids	Complex structures with simple or modified cholane nucleus (see p. 354)
A. Sterols and esters	
1. Cholesterol or animal sterol	
2. Phytosterol or plant sterol	
3. Ergosterol, found in both plant and animal, but chiefly in fungi, as yeast, mushrooms	
B. Provitamin and Vitamin D	
C. Certain hormones, as	
1. Estrins	
2. Corpus luteum hormone	
3. Male sex hormone	
D. Bile acids	
E. Certain carcinogenic agents, and many others	
V. Other Fat-soluble Vitamins	Hydrocarbon or oxygen derivative
A. Carotenes and A vitamins	
B. Tocopherols and E vitamins	
C. Naphthoquinones and K vitamins	

This classification reveals wide diversity of chemical structure. While the substances listed possess many vital functions, it is apparent that, except for the fatty acids, they are not the source of the calories attributed to fat. For fat as fuel, consult p. 37.

The amount and character of body fat is dependent upon the diet. The distribution of that fat is controlled by glandular and poorly understood constitutional factors.

Most of the fatty acids are saturated, that is, they can combine with no more hydrogen. They range from 2 to 24 carbon atoms per molecule. The body can de-saturate these to the extent of one double bond only. For growth, fatty acids with 2, 3 or 4 double bonds are needed, as linoleic, linolenic and arachidonic respectively. These are the essential fatty acids (refer also to p. 355) but any one of them will suffice if fed in adequate amount. These acids also function in preventing some forms of dermatitis presumably working in conjunction with pyridoxine, pantothenic acid and possibly other B vitamins. The essential fatty acids are concerned also with preventing fatty infiltration of the liver, failure of proper fat deposit in storage areas and development of certain kidney lesions.

Agents, as choline, which prevent deposit of fat or accelerate its removal from the liver are termed "lipotropic." Choline has a profound effect on storage and transport of fat, upon growth and other processes yet to be clarified. Part of its function is furnishing sufficient labile methyl groups for fat utilization. Methyl donors

include lecithin, choline, betaine, and methionine. Inositol, despite its very different structure (p. 295) is also lipotropic.

Excess fat in the liver results from a wide variety of conditions including dietary imbalance as imposed by starvation, high-fat or high-cholesterol intake, insufficiency of essential fatty acids, deficiency in methionine or choline, excessive amounts of thiamine, riboflavin, niacin, or biotin, and inadequacy of pyridoxine, panthothenic acid or inositol. Adjustment is involved and complex; it is cited to illustrate again the impossibility of separating metabolism into separate and distinct categories.

Requirement.—Since adequate experimental data are not available, it is difficult to fix a safe lower limit for fat ingestion. For suitable fat intake, see p. 38-40. Fats are required in the diet when there is a high-caloric need. They are aptly described by Whiteman and King as adding "flavor, richness, and a staying quality" to the meal.

Animals placed on a fat-free diet fail to show maximum growth and develop skin abnormalities. Excessive skin dryness in human beings can often be traced to a low-fat diet. Inadequate intake of fats is accompanied by deficiency in the natural, fat-soluble vitamins. Since the carbohydrate reserves are limited, a fair storage of fats is desirable to meet satisfactorily the emergencies of life. The protective cushioning effect of storage fat and its heat-insulating qualities are not lightly to be cast aside if full vigor and health are to be achieved.

Sources.—Essential unsaturated fatty acids are found in butter, cod-liver oil, lard, margarine, and salad oils. Hydrogenation of vegetable oils to obtain more desirable properties (as in treating peanut butter to lessen oil separation, or in converting oil to shortening of lard-like consistency) diminishes the unsaturation of the fat.

The dietary fat should include both vitamin A and E sources. The former occurs in butter, fortified margarine, cheese (except cottage), and eggs. Such vegetable oils as corn, cottonseed, peanut, and soy, furnish vitamin E; margarine, therefore, is superior to butter in this regard. Bacon and lard are vitamin-poor.

The avocado (alligator pear) and the olive are outstanding exceptions among the fruits and vegetables in that their fat content is appreciable.

Foods Rich in Fats.	Foods Poor in Fats.
Avocados	Bouillon
Bacon and other fat meats	Bread
Bone-marrow	Breast of boiled fowl
Butter, cream	Cereals, refined
Caviar	Cheese, skim milk
Cheese, whole milk	Codfish
Chocolate	Egg-white
Egg-yolk	Flounder
Fried foods	Flour
Goose, turkey	Fruits
Lard	Haddock
Mayonnaise	Litchi "nuts"

Foods Rich in Fats.	Food Poor in Fats.
Nuts, except chestnuts	Meat extracts
Oils, except mineral	Perch
Olives	Pickerel
Pastry	Shellfish
Suet	Skim milk
	Vegetables

Foods Rich in Cholesterol.	Foods Poor in Cholesterol.
Butter	Cereals
Egg-yolk	Egg-white
Fish roe	Fruits
Lard	Nuts
Organ meats	Vegetable oils
Suet	Vegetables

In Table 29 only cholesterol is shown as the plant sterols are absorbed but slightly unless they are irradiated as is done with ergosterol.

Table 29.—**Cholesterol Content of Foods.**†

Food items.	*mg. per 100 grams (moist wt.)*	*Food items.*	*mg. per 100 gram (moist wt.)*
Beef, round, lean	95	Egg-yolk, hen's, fresh	2000
med. fat	125	dried	3900
Brains, beef	2200	Heart, beef	150
Butter	280	poultry	160
Cheese:		Kidney, beef	400
American	160	Liver, beef	190–320
processed	155	calf	360
Limburger, processed	135	lamb	610
Monterey Jack	190	pork	420
Pimento cream	140	Lungs, beef	350–390
Swiss	145	Oysters*	230–470
Velveeta	160	Pork spareribs	105
Crab*	145	Sweetbreads	220–280
Egg, hen's, whole fresh	468	Tripe	150
dried	2140	Veal, breast	100
		shank	140
		Yeast, brewer's, dried*	680

* These foods contain sterols other than cholesterol; figure represents total digitonin precipitate.

† Data from Okey, R.: Jour. Am. Dietet. Assn. **21**, 341, 1945.

CHAPTER 6.

WATER.

Properties. Inasmuch as water forms the bulk of the body and its loss is continuous, the physiological need is obvious. A person may be deprived of food for a long period of time, but water can be withheld only for a few days. Muscle tissue holds 40 to 45 per cent of the total body water, the skin over 20 per cent. These two tissues suffer most from dehydration when the supply of water is inadequate. Formerly it was thought that in mammalian muscle 19 to 27 per cent of the total muscle water was "bound" to the colloids and did not function as free water. Present opinion regards the amount of "bound" water as negligible. While protein stores hold 3 or more parts of water, fat and glycogen are laid up almost dry. Since a dietary change from high fat to carbohydrate results in water retention, glycogen storage was assumed to require water but this is currently disputed although the water storage goes unexplained. Conversion of glucose to glycogen for storage purposes involves change to a colloidal form which has little effect upon the osmotic pressure of the system. The marked decrease in solubility in passing from glucose to glycogen prevents the circulating water from washing this carbohydrate from the tissues.

Water is continually shifting about the body so as to provide vehicles for digestive juices and other secretions, to transport nutriment, and to carry off waste-products. Equilibrium within narrow limits is maintained between circulating fluids, extracellular and intracellular water. Adjustment can be made very rapidly. Forced administration of great quantities of water leads to an intoxication which is characterized by convulsions and renal fatigue.

Water is produced within the body by chemical changes. Each molecule of glucose, $C_6H_{12}O_6$, converted to glycogen $(C_6H_{10}O_5)_n$, provides 1 molecule of water. Oxidation of glucose releases 6 molecules of water for every molecule burned which amounts to about 60 grams of water for every 100 grams of carbohydrate. Alcohol releases about 118 grams of water for every 100 grams oxidized. Combustion of fats and proteins likewise produce water, the former yielding over 100 grams of water, the latter 40 to 45 grams per 100 grams of food oxidized.

A person on a reducing diet should realize that oxidation of body fat will release water which often fails to be excreted as produced; after several days the accumulated water is eliminated quickly. An ordinary, mixed, calorically-adequate diet yields 300-350 grams of water daily from oxidation; this value is raised by increasing the amount of fat oxidized whether the fat come from food or from the tissues.

Water retention is curtailed by a high-protein, low-salt diet in which there is an adequate supply of the vitamin B complex. A low Na:K ratio is requisite. Refer also to pp. 276, 277.

Ingestion. Seventy-five to 80 per cent of the total food eaten is water. The amount demanded per day depends upon the dietary habits of the individual and upon climatic conditions. In the California desert, 11 to 12 liters a day are needed for heat regulation; even then it is possible to suffer from thirst. Whenever the surrounding temperature equals or exceeds 98.6° F., heat is lost, not by conduction and radiation, but only by evaporation of water. The normal requirement of water approaches 2 liters per day, or about 1000 cc. more than that eliminated by the kidneys. In forcing fluids, a glass an hour is recommended. Three liters a day is the usual limit for a 150-pound adult, comparable amounts for an infant being 90 to 100 cc., for a child, aged five to eight years, 600 to 800 cc., and for one, aged eight to twelve years, 1000 to 1500 cc.

Elimination.—The kidneys excrete 1000 to 1500 cc. per twenty-four hours. The volume decreases as perspiration increases. Insensible loss of water does not exceed 21 grams per square meter of body surface per hour. According to Marriott, the average adult exercising lightly in an atmosphere of 65° to 75° F., with 35 to 60 per cent humidity, eliminates 30 to 60 grams of water per hour by evaporation, which amounts to 10 to 20 grams per kilogram of body weight per day, a total of 650 to 1400 cc. of water. This includes the water lost through the expired air—approximately 600 cc. per day. The loss of water through normal fecal excretion is 60 to 150 cc. daily.

About 70 per cent of the body weight is water. Loss of one-fourth of this generally is fatal. The water content of various tissues follows (Best and Taylor, 1945):

	Per Cent		*Per Cent*
Adipose tissue	20	Muscles	75–80
Blood plasma	92	Nervous tissue	
Cells	60	Gray matter	85
Bone (marrow-free)	25	White matter	70
Connective tissue	60		

Water Balance.—Under normal conditions the output of water balances the intake. For the average adult this means:

Available Water.		*Excreted Water.*	
Food	950 cc.	Kidneys	1300 cc.
Drink	1200 cc.	Lungs	600 cc.
Oxidation	350 cc.	Skin	500 cc.
		Intestines	100 cc.
	2500 cc.		2500 cc.

Foods Rich in Water. (More than 70 per cent.)	Foods Poor in Water. (Less than 30 per cent.)
Beverages	Butter
Cream	Cakes
Cream cheese	Candy
Eggs	Cereals, ready-to-eat
Fruit ices	Crackers, biscuits
Fruits	Dried fruits
Gelatin preparations	Jellies
Gruels	Molasses
Junket	Nuts
Salad vegetables	Popcorn
Sherbets	Potato chips
Soups	Suet
Stews	Syrups, honey
Vegetables, boiled	Toast

Table 30. – **Water Content of Various Foods as Eaten.** *

Food items.	*Per cent.*
Almonds	5
Apples	79–91
Apricots	82–92
Artichokes, French, cooked	85
Artichokes, Jerusalem, cooked	80
Asparagus, cooked	92–95
Avocados	55–84
Bananas (av. 75 per cent)	65–83
Beans:	
Baked	68–70
Kidney, cooked	72–73
Lima, canned	80
String, cooked	93–95
Beef, cooked	52–60
Beets, cooked	80–85
Brazil nuts	8
Bread, including rolls	25–36
Bread, freshly baked‡	31–38
Bread, air-dried	10–15
Bread, toasted	5–10
Broccoli, cooked	90–93
Brussels sprouts	90–95
Butter	15–16
Cabbage, boiled	92–95
Cabbage, raw	88–94
Cabbage, Chinese	94–97
Cake	16–30
Candy	4– 6
Carrots, raw	83–91
Carrots, cooked	81–92
Cauliflower, cooked	94–95
Celeriac	84–91
Celery	90–95
cooked	96
Cereals, prepared	8–10
Cheese:	
American	28–38
Camembert	43–54

Food items.	*Per cent.*
Cheese:	
Compounded	43
Cottage	63–72
Cream	38–43
Cream, Phila.	74
Parmesan	15–30
Potted cottage	39
Process	40
Roquefort	37–40
Soft rennet	50–60
Swiss	25–35
Cherries	75–85
Chestnuts, fresh	52
Chicken, cooked	55–65
Chicory	91–96
Chocolate	6
Cocoanut, canned moist	16
Cocoanut, desiccated	5
Cocoanut, fresh	42
Cookies	3–10
Corn,† young	76–86
Corn,† medium	69–75
Corn,† old	60–68
Corn, canned	76
Cornsalad	92–93
Crackers, biscuits	3– 7
Cream	54–73
Cress, garden	81–93
Cucumbers	95–97
Currants, fresh	77–84
Damsons	77–78
Dandelion greens	81–88
Dates	15–20
Dock or sorrel	92–95
Egg-white	86
Egg-yolk	49
Eggs, whole	73–74
Endive	91–96
Fennel	93

‡ 38% is standard.

* "Cooked" implies boiled.

† Raw, for comparative purposes only.

Table 30. Water Content of Various Foods as Eaten.* (*Continued*).

Food items.	*Per cent.*
Filberts	40
Figs,** fresh	50–88
Fish, cooked	52–70
Fish pastes, English	55–70
Fruits:	
Berries	83–90
Cherries	75–85
Citrus	86–89
Dried	15–30
Grapes	75–87
Melons	92–94
Orchard	77–87
Tropical	65–85
Fruit butters	37–50
Fruit juices:	
Apple	87
Citrus	91–96
Grape	80
Pineapple	85
Grapefruit	86–91
Grapes	75–87
Greens, cooked	90
Ham, cooked	45–50
Honey	17–18
Horseradish	73–74
Ice-cream	55–62
Ices	70–75
Jellies	15–20
Lamb, cooked	45–67
Leeks	85–92
Lentils, cooked	72
Lettuce	91–97
Litchi, dried	18
Milk:	
Condensed	27–30
Evaporated	74
Whole	85–88
Skim and buttermilk	90–91
Molasses	20–25
Mushrooms, fried	60–65
Mustard greens	87–96
Mutton, cooked	45–67
Nectarines	83
Olives, green	58
Olives, ripe	65
Onions, raw	80–90
Onions, cooked	91–92
Onions, fried	40–45
Oranges	83–90
Parsley	79–88
Parsnips, cooked	83–90
Peaches	82–90
Peanut butter	2
Peanuts	5–9
Pears	76–86
Peas, green, cooked	75–85
Peas,† young	80–84
Peas,† medium	70–79
Peas,† old	57–69
Peppers, green	91–94
Pineapple, fresh	81–90
Plums	74–91
Potatoes, sweet, baked	52–55
Potatoes, sweet, boiled	72
Potatoes, white:	
Baked	45
Boiled	75–80
Chips	2–6
French fried	47
Mashed	73
Roast	64
Prunes	20–25
Radishes	87–96
Raisins	18–22
Rhubarb	94
Salad greens	93–96
Sauerkraut	88–89
Shellfish	70–85
Soups	80–95
Spinach, cooked	85
Stew, meat	83–88
Succotash, cooked	76
Swiss chard	90–95
Syrup, corn	25
Syrup, maple	25–30
Squash, boiled	93–94
Tangerines	88–91
Tomato juice	94
Tomatoes	93–95
Tomatoes, fried	85–87
Turnip tops, cooked	92–93
Turnips, cooked	94–95
Turnips, raw	86–96
Vegetable marrow, cooked	95–99
Vegetables	85–98
Walnuts	20–25
Watercress	91–97
Watermelon	91–93

* Average 78 per cent.

† Raw, for comparative purposes only.

CHAPTER 7.

ACIDITY OF FOODS.

Foods as eaten create an impression of neutrality or acidity; this reaction can be stated in terms of pH. Some slight alteration may occur in the alimentary tract but the major change awaits combustion in the tissues. An extraordinarily acid-tasting food may be converted in the body (but not in the digestive organs) to a definitely alkaline substance. Neutral foods, on the other hand, may give rise to acids during the course of metabolism. If a food is to be classed as alkaline or acid, it is necessary to specify whether it is to be regarded from the standpoint of its own reaction or its metabolic ash. The succeeding tables present data on both aspects.

Nature of Mineral Residues.—Oxidation of food within the body results in the formation of a *residue* or *ash*. When sodium, potassium, calcium, and magnesium predominate over sulfate, phosphate, chloride, and uncombusted organic acid radicals, they are designated as "alkaline-ash" foods. Most vegetables and fruits are *alkaline* in their final reaction within the body whereas meats, poultry, fish, cheese, eggs, and cereals are *acidic*. It should be noted that a "vegetarian" diet does not necessarily produce an alkaline residue. As Blatherwick has pointed out, a high-cereal intake may have a more acidic effect than an ordinary mixed diet. From the standpoint of reaction, starchy foods fall into two groups: (1) Cereal and grain products which yield acid substances on oxidation; and (2) tubers and roots which produce an alkaline reaction. The banana is an alkaline starchy fruit. The legumes, except peanuts and lentils, are usually regarded as potential alkalinizers. Since the mineral content of practically pure fats and pure carbohydrates is negligible, they are classed as *neutral-ash* substances. Such foods include tapioca, table sugar and syrups, cream, butter, etc.

The reaction of a food as ingested is no criterion as to the ultimate effect upon the acid-base balance of the body. When foods are ashed in the laboratory, some show a strongly alkaline reaction whereas others yield a nearly neutral ash. This residue gives no clue as to its origin nor to those substances lost through volatilization. Since, in general, the basic elements are retained in the ash, a neutral residue is indicative of a preponderance of acid-forming constituents in the actual food. Sulfur, which exists chiefly in protein combination, is almost entirely expelled during ignition. The sulfate of the ash represents only a very small part of the food sulfur. If the base-forming elements predominate, loss of acid-forming elements is largely prevented. To obtain numerical values for food "ash" it is necessary to determine the concentrations of the various elements separately, to compute them in terms of equivalents, and to express

the excess of one group over the other as cubic centimeters (or milli-equivalents) of normal acid or base per 100 grams of edible food material. Such figures are referred to as *degrees of acidity or alkalinity*. Since this involves an enormous amount of painstaking analytical work, accumulation of data has been limited to a few investigators, notably Sherman in this country, McCance and Widdowson in Great Britain, and Berg in Germany.

It is interesting to note that this tabulated data from the literature shows macaroni, whether cooked or raw, as acidifying. Cheddar cheese also rates an acid ash, yet "macaroni and cheese" as served is found to give an alkaline ash. Although cheese is usually listed as acidic, Gruyère and Parmesan are reported as leaving an alkaline residue. Raw peas give an alkaline ash, but when cooked or canned are acidic. An English apple pie is metabolically acid, an American one alkaline. An English rice pudding is alkaline, an American one with raisins (a highly "alkaline" food) is reported to be acid! Rusk, which might be thought to fall into the same category as bread or Zwieback, is found to be alkaline, as is German pumpernickel bread. Boiled sea-kale is acid and fried smelts alkaline. Cream of pea and tomato soups are alkaline, but potato soup is acid.

The data shown in Table 37 are to be used, if at all, with the greatest discretion. For more than a quarter of a century, Sherman has questioned the merit of balancing acid-forming and base-forming foods although the less well informed have not hesitated to work out diets of specific ash values. For *metabolic* purposes, the diet should be "balanced" with reference to protein, carbohydrate, fat, minerals, vitamins and water; there is no need to consider the ash left by such a diet.

The conventional classification of "ash" constituents is as follows:

Group I.	*Group II.*	*Group III.*
Acidic-Ash Foods.	*Neutral-Ash Foods.*	*Alkaline-Ash Foods.*
Meats, fish, poultry	Butter	Fruits, except as shown
Eggs, cheese	Cream	Vegetables
Cereals	Cooking fats	Milk
Nuts (filberts, peanuts, walnuts)	Starches	Nuts (almonds, brazils, chestnuts, cocoanut)
Cranberries, plums, prunes	Sugars, syrups	

A diet confined to any of these lists is generally regarded as nutritionally unsatisfactory because it is deficient in recognized essential constituents to be found in the other groups. A well-rounded diet demands foods listed in all three.

ACIDITY OF FOODS.

The data shown in Tables 31, 32 and 33 represent acidity measurements with the glass electrode (Bridges and Mattice, 1939). A few other values are to be found in the literature. Shrimp paste is

placed at pH 6.28 to 6.43 by Monier-Williams (1924). Flour is reported to be pH 5.7, bread 5.3, cake 6.7, and macaroni 5.9 (Clark, 1935). Clague and Fellers (1936) used the quinhydrone electrode for the study of cider made from different varieties of apples; their values ranged from pH 3.1 to 4, including data with reference to clarification processes. Kidd and Hanes (1936) reported increase in the pH (2.8 to 3.7) during storage of apples, the rise being related to warmth of storage atmosphere. The pH of lettuce kraut is placed at 5.1 to 5.25 by Cruess and Gilliland (1939). Valaer (1939, 1940) found Scotch whisky to vary from pH 4 to 4.78; domestic and foreign brandies generally fall within the range pH 3 to 5, the acidity in part being attributable to slow production of sulfuric acid.

Haas (1938) examined different sections of the avocado for variations in pH. The inner and outer portions of the soft edible pulp (without skin) of the stem halves of mature fruit were pH 6.82 and 6.72 respectively, whereas the corresponding portions of the tip halves had values of 6.64 and 6.44.

According to Smith (1935) fresh egg-white has a pH of 7.97 but changes to 9.2 to 9.5 on loss of CO_2 during storage. It is believed that the quality is best preserved by holding the pH at 7.5 to 8 by means of carbon dioxide. Ulrik and Davidsen (1933) record the pH of the new-laid egg at approximately 8.2 with a rapid rise to 9.4 during the first twelve hours succeeded by gradual increase to 9.8 by the ninth day. They found no distinct change thereafter until the fifty-third day. Our findings are presented in Table 31.

TABLE 31.—**Variation in pH of Eggs With Age.**

Age.	Whole.	White.	Yolk.
3 hours	6.58	7.96	6.10
	7.00	8.20	6.88
12 hours (or less)	6.70	7.90	6.00
24 hours	6.62	8.30	6.10
	6.60	8.35	6.10
48 hours	7.43	8.89	6.17
	7.87	8.85	6.29
"New-laid" store eggs	7.72	9.18	6.64
	7.72		
Cold-storage eggs*	7.50	8.87	7.00
	7.60	8.99	6.90
	7.69	8.80	6.38
	7.58	8.90	6.72
	7.32	9.00	6.82
	8.20	8.63	7.80
	7.90	9.00	7.20
	7.62	9.00	

* Except for this group (where each analysis is on a different egg) data carried across the table represent tests on the same egg, the white and yolk being mixed after separate determinations.

Blue or American Roquefort cheese was found to fall within the range pH 4.7 to 6.5 by Coulter and co-workers (1938).

Butter is reported by Parsons (1940) as varying from pH 6.6 to 7. The values noted by Pont and Sutton (1938) varied from 7 to 7.7. Kretchmar (1938) observed marked correlation between the initial flavor score and the pH findings, the butters with higher flavor score generally being less acid than those with lower scores. The optimum acidity for the keeping quality of butter was stated to be pH 6.7 to 6.9, it being regarded as undesirable to store butter if the pH was less than 6.3 or more than 7.1.

TABLE 32.—**pH of Representative Foods.***

Item.	pH
All Bran	6.00, 5.59, 5.62, 5.63, 5.70, 5.19
Anchovies, stuffed with capers, in olive oil	5.58
Anise (fennel)	5.48, 5.62, 6.72, 5.78, 5.80, 5.87
Apples, eating	3.33, 3.38, 3.58, 3.35, 3.84, 3.84
Apples, baked with sugar	3.20, 3.22, 3.28, 3.55, 3.54, 3.50
Apple juice, canned	3.62, 3.52, 3.38, 3.40, 3.35, 3.42
Apple sauce, canned	3.40, 3.23, 3.15, 3.10, 3.09, 3.12
Apple sauce, chopped, Clapp	3.24, 3.24, 3.24, 3.24, 3.35, 3.35
Apple sauce, strained, Clapp	3.24, 3.24, 3.24, 3.24, 3.42, 3.42
Apple-currant jelly, com.	3.00
Apricots	4.50, 4.22, 4.67, 4.33, 4.52, 4.18
Apricots, canned	3.46, 3.42, 3.42, 3.45, 3.42, 3.47
Apricots, unsweetened, canned	3.78
Apricots, puréed, Stokely	3.80, 3.83, 3.70, 3.68, 3.62, 3.42
Apricots, strained, Clapp	3.81, 3.78, 3.81, 3.72, 3.95, 3.72
Apricots, dried, stewed	3.51, 3.37, 3.30, 3.40, 3.40, 3.30
Apricot Nectar (pulp, juice, sugar, water), com.	3.78
Arrowroot crackers	6.63, 6.80, 6.72
Arrowroot gruel	6.37, 6.57, 6.67, 6.87
Artichokes, French, cooked	6.00, 5.75, 5.70, 5.81, 5.80, 5.75
Artichokes, Jerusalem, cooked	6.00, 5.93, 6.00, 6.00, 5.98, 5.93
Asparagus, cooked	6.03, 6.13, 6.10, 6.16, 6.10, 6.10
Asparagus, frozen, cooked	6.42, 6.35, 6.39, 6.48, 6.40, 6.43
Asparagus, green, canned	5.21, 5.32, 5.23, 5.30, 5.20, 5.30
Asparagus, strained, Clapp	5.09, 5.09, 5.09, 4.82, 5.09, 4.80
Avocados, Cuban	6.47, 6.27, 6.42, 6.27, 6.58, 6.54
Baby soup, unstrained, Clapp	5.00, 5.00, 5.00, 5.00, 5.00, 5.00
Bacon, broiled	5.80, 5.20, 5.80, 6.12, 6.10, 6.00
Bacon, Canadian, broiled	5.70, 5.60, 5.43, 5.57, 5.50, 5.73
Banana Nectar (pulp, juice, fruit acids, sugar, water), Hawaii	3.00
Bananas, red	4.58, 4.62, 4.62, 4.65, 4.68, 4.75
Bananas, yellow	5.21, 5.29, 5.00, 5.12, 5.04, 5.10
Barley, cooked	5.19, 5.25, 5.32, 5.28, 5.32, 5.29
Bass, sea, broiled	6.70, 6.70, 6.64, 6.70, 6.58, 6.68
Bass, striped, broiled	6.60, 6.50, 6.60, 6.58, 6.60, 6.70
Beans, black, cooked	5.82, 5.78, 5.93, 6.00, 5.98, 6.02
Beans, Boston-style, home-baked	5.05, 5.09, 5.12, 5.15, 5.12, 5.12
Beans, Boston-style, com.	5.42

* Data is presented for the edible portion of foods in the raw state unless otherwise designated. Cooking signifies boiling unless otherwise specified. The general order is as follows: raw, home-cooked, frozen, canned, commercial (com.), dried, etc. Trade names are italicized. Bridges, M. A., and Mattice, M. R.: Am. Jour. Digest. Dis., 7, 440, 1939.

Item.	pH
Beans, pork and tomato sauce, canned	5.34
Beans, vegetarian, tomato sauce, canned	5.32
Beans, kidney, cooked	5.85, 5.90, 6.00, 6.01, 6.02, 6.07
Beans, lima, green, cooked	6.19, 6.21, 6.30, 6.19, 6.28, 6.40
Beans, lima, frozen, cooked	6.50, 6.56, 5.75, 6.67, 6.45, 6.90
Beans, lima, canned	5.76, 5.78, 5.86, 5.90, 5.86, 5.90
Beans, lima, dried, cooked	6.12, 6.40, 6.37, 6.40, 6.48
Beans, navy, cooked	5.96, 6.00, 6.01, 6.01, 6.10
Beans, string, cooked	5.73, 6.73, 5.86, 6.08, 6.20, 6.18
Beans, string, canned	4.72, 4.62
Beans, string, chopped, Clapp	5.01, 5.01, 5.01, 5.01, 5.10, 5.01
Beans, string, puréed, Stokely	4.66, 4.96, 5.00, 4.80, 4.84, 4.78
Beans, string, strained, Clapp	5.08, 5.08, 5.08, 5.08, 5.12, 5.15
Beans, wax, cooked	5.52, 5.50, 5.58, 5.61, 5.70, 5.68
Beef broth, Clapp	6.14, 6.18, 6.14, 6.20, 6.20, 6.20
Beef with vegetables, chopped, Clapp	5.50, 5.50, 5.49, 5.50, 5.58, 5.50
Beef with vegetables, strained, Clapp	5.17, 5.17, 5.18, 5.18, 5.05, 5.15
Beef, filet mignon, broiled	6.40
Beef, pot-roasted	6.88
Beef, ribs, roasted	6.22, 6.50, 5.92, 6.93
Beef, round, chopped, broiled	6.23, 6.22
Beef, scraped, raw	5.60
Beef, steak, round, broiled	5.51
Beefsteak, sirloin, broiled	6.30, 6.10
Beet greens, cooked	6.62, 6.58, 7.01, 6.70, 6.70, 6.77
Beets, cooked	5.23, 5.52, 5.72, 5.41, 5.82, 5.90
Beets, canned	4.95, 4.97, 4.98, 4.97, 4.97, 4.92
Beets, chopped, Clapp	5.56, 5.56, 5.56, 5.56, 5.32, 5.32
Beets, strained, Clapp	5.56, 5.56, 5.56, 5.56, 5.32, 5.38
Bouillon, com.	4.90, 5.14
Blackberries, Washington	4.40, 4.50, 4.40, 4.40, 4.25, 3.85
Blueberries, Maine	3.22, 3.32, 3.12, 3.22, 3.18, 3.20
Blueberries, frozen	3.35, 3.17, 3.11, 3.16, 3.20, 3.22
Bluefish (Boston), filet, broiled	6.50, 6.30, 6.10, 6.13, 6.09, 6.06
Brambleberry (wild) jelly	3.15
Bran Flakes	5.45, 5.45, 5.60, 5.67, 5.50, 5.65
Bread, Boston brown	6.53
Bread, corn	6.17
Bread, cracked wheat	5.43, 5.50
Bread, pumpernickel	4.40
Bread, rye	5.46, 5.90, 5.48, 5.20, 5.60, 5.63
Bread, white	5.42, 5.50, 5.65, 5.29, 5.43, 5.36
Bread, whole wheat	5.60, 5.48, 5.85, 5.60, 5.47, 5.61
Breadfruit, cooked	5.33
Broccoli, cooked	6.41, 6.46, 6.52, 6.32, 6.40, 6.30
Broccoli, frozen, cooked	6.20, 6.88, 6.43, 6.50, 6.43, 6.48
Brussels sprouts, cooked	6.05, 6.15, 6.00, 6.01, 6.05, 6.01
Buttermilk	4.48, 4.42, 4.45, 4.41, 4.83, 4.42
Cabbage, green	5.90, 6.13, 6.18, 5.90, 5.79, 6.29
Cabbage, green, cooked	6.77, 6.82, 6.70, 6.65, 6.38, 6.56
Cabbage, red	5.43, 5.82, 5.86, 6.00, 5.75, 5.82
Cabbage, red, cooked	6.31, 6.31, 6.42, 6.31, 6.21, 6.41
Calamondin juice	2.59, 2.51, 2.60, 2.48, 2.41, 2.50
Calamondin marmalade, com.	2.82
Calves' liver, broiled	6.45, 5.90, 6.10, 5.90, 5.96
Cantaloupe	6.57, 6.28, 6.43, 6.17, 6.58, 7.13
Carrots	6.00, 5.88, 5.98, 5.99, 5.96, 6.00
Carrots, cooked	5.70, 5.80, 5.88, 5.62, 5.58, 5.58
Carrots, canned	5.20, 5.22, 5.20, 5.18, 5.19, 5.20
Carrots, chopped, Clapp	5.56, 5.56, 5.56, 5.56, 5.30, 5.30
Carrots, puréed, Stokely	4.55, 4.75, 5.00, 4.72, 4.74, 4.67
Carrots, strained, Clapp	5.10, 5.10, 5.10, 5.10, 5.10, 5.10
Cauliflower, cooked	6.45, 6.48, 6.67, 6.72, 6.71, 6.80
Cauliflower, frozen, cooked	6.07, 6.02, 6.10, 5.90, 5.95, 6.00
Caviar, American	5.40

Item.	pH
Celery	5.88, 6.00, 5.86, 5.70, 5.90, 5.90
Celery, cooked	5.37, 5.38, 5.50, 5.80, 5.92, 5.70
Celery cabbage	5.92, 6.02, 6.22, 6.26, 6.28, 6.26
Celery knob (celeriac), cooked	5.80, 5.71, 5.65, 5.71, 5.79, 5.71
Cereal, strained, Clapp	6.44, 6.44, 6.44, 6.44, 6.20
Chard, Swiss, cooked	6.78, 6.28, 6.25, 6.25, 6.30, 6.17
Chayote, cooked	6.30, 6.05, 6.00, 6.13, 6.18, 5.90
Cheese, American, mild, Kraft	4.90
Cheese, Camembert	7.44
Cheese, Cheddar, English	5.90
Cheese, cottage	5.02, 5.02, 4.75
Cheese, cream, Philadelphia	4.79, 4.10, 4.45, 4.88
Cheese, Edam	5.40
Cheese, *Old English*, Kraft	6.15
Cheese, Roquefort	5.41, 5.64, 5.98, 5.93, 6.10, 5.41
Cheese, *Snappy*, Kraft	5.18, 5.21
Cheese, Stilton	5.70
Cheese, Swiss Gruyere	6.62, 5.17, 5.77, 5.68, 5.73
Cherries, California	4.54, 4.16, 4.15, 4.06, 4.01, 4.08
Cherries, frozen	3.37, 3.35, 3.32, 3.35, 3.35, 3.35
Cherries, sour, red, New York	3.20, 3.12, 3.20
Cherries, black, canned	3.89, 3.93, 3.86, 3.87, 3.88, 3.82
Cherries, Maraschino, com.	3.52, 3.50, 3.50, 3.50, 3.49, 3.47
Cherries, red, water-pack	3.29, 3.29, 3.25, 3.32, 3.32, 3.32
Cherries, *Royal Anne*, com.	3.80, 3.80, 3.82, 3.83, 3.80, 3.83
Chicken, broiled	6.50, 6.26, 6.28, 6.08, 6.13, 6.20
Chicken, *also see* Fowl.	
Chicken liver, broiled	5.99, 6.20, 6.10
Chicory	5.90, 6.05, 6.05, 5.89, 5.89, 6.05
Chives	5.64, 5.75, 5.25, 6.10, 6.31, 5.81
Clams	6.40, 6.58, 6.60, 7.02, 6.58, 6.63
Cocoanut, fresh	5.90, 6.00, 6.00, 6.52, 6.18, 6.00
Cocoanut water	5.04
Codfish, boiled	5.32
Conchs	7.52, 8.20, 8.40, 8.06, 8.10, 8.07
Corn, golden bantam, cooked on cob	6.76, 7.04, 6.35, 6.81, 6.22, 7.00
Corn, frozen, cooked	7.33, 7.44, 7.50, 7.57, 7.60, 7.68
Corn, canned	6.09, 6.44, 6.07, 6.07, 5.90
Corn Flakes	5.38, 5.00, 4.88, 4.90, 4.97, 4.85
Corned beef, brisket, boiled	6.13
Corned beef, pressed, canned	5.75, 5.79, 5.85, 5.96, 6.01, 6.00
Crabapple jelly, com.	3.02, 2.98, 2.97, 3.00, 3.00
Crabmeat, cooked	6.62, 6.77, 6.92, 6.97, 6.93, 6.98
Cranberry juice, canned	2.40, 2.52, 2.35, 2.31, 2.30, 2.30
Cranberry sauce, com.	2.40
Cream, 20 per cent	6.52, 6.62, 6.68, 6.52, 6.50, 6.53
Cream, 40 per cent	6.44, 6.60, 6.60, 6.52, 6.48, 6.50
Cream of Wheat, cooked	6.06, 6.10, 6.15, 6.16, 6.16, 6.10
Cucumbers	5.70, 5.78, 5.18, 5.52, 5.18, 5.55
Cucumbers, pickled	2.70
Cucumbers, pickled, bread-and-butter type	3.68, 3.70
Currant, black, jam	3.78
Dates, *Dromedary*	4.58, 4.74, 4.81, 4.88, 4.80, 4.82
Duck, roasted	6.62, 6.40, 7.02, 6.28, 6.00, 6.02
Eggs, new-laid, whole	6.58
white	7.96
yolk	6.10
Eggs, *also see* Table 61.	
Eggplant, cooked	5.41, 5.41, 5.49, 5.45, 5.45, 5.33
Escarolle	5.70, 5.92, 5.92, 5.92, 6.00, 5.95
Farina (1:8, cooked ½ hour)	5.98, 5.98, 5.80, 5.82, 5.94, 6.02
Fennel (anise)	5.48, 5.62, 6.72, 5.78, 5.88, 5.87
Fennel, cooked	6.02, 6.00, 5.80, 5.88, 5.95, 5.88
Figs, Calamyrna	5.05, 5.08, 5.08, 5.18, 5.27, 5.11
Figs, canned	5.00, 5.00, 4.92, 5.00, 4.98, 4.98
Finnan haddie, boiled	6.28, 6.55, 6.43, 6.40, 6.33, 6.30

Item.	pH
Flounder, boiled	6.90, 6.73, 6.60, 6.57, 6.60, 6.64
Flounder, filet, broiled	6.89, 6.39, 6.50, 6.66, 6.70
Fowl, boiled	6.20, 6.10, 6.70, 6.40, 6.37, 5.70
Frankfurters, boiled	6.10, 6.18, 6.15, 6.18, 6.22, 6.22
French Dressing, Kraft	3.52
Fruit, mixed, dried, stewed (apricots, prunes, peaches, apples)	3.53, 3.59, 3.50, 3.27, 3.30, 3.33
Gelatin, plain jell	6.08
Gelatin dessert:	
Lime	2.60
Raspberry	3.19
Sherry-wine	3.37
Golden berries (South Africa), canned	3.80
Goose, roasted	5.96, 5.90, 5.98, 6.00, 5.93, 5.98
Gooseberry jam, com.	2.93
Graham crackers	7.12, 7.10, 7.10, 7.75, 7.92
Grape juice, com.	3.00, 3.00
Grape juice (dil. 1:1)	3.05, 3.06
Grapes, Concord	2.79, 3.00, 2.95, 2.91, 2.88, 2.82
Grapes, lady finger	3.55, 3.58, 3.53, 3.53, 3.51, 3.51
Grapes, Malaga	3.73, 3.71, 3.78, 3.71, 3.73, 3.73
Grapes, Niagara	2.80, 2.86, 3.14, 3.10, 3.27, 3.14
Grapes, Ribier	3.73, 3.80, 3.77, 3.75, 3.70, 3.76
Grapes, seedless	3.81, 2.90, 3.12, 3.28, 3.40, 3.62
Grapes, Tokay	3.72, 3.50, 3.59, 3.64, 3.50, 3.64
Grapefruit	3.70, 3.42, 3.75, 3.22, 3.31, 3.30
Grapefruit, canned	3.10, 3.08, 3.29, 3.32, 3.29, 3.32
Grapefruit juice, canned	3.25, 3.18, 3.00, 2.90, 2.90, 2.92
Grapenuts	5.40, 5.22, 5.18, 5.20, 5.15, 5.10
Greens, mixed, chopped, Clapp	5.22, 5.22, 5.22, 5.22, 5.05, 5.05
Greens, mixed, strained, Clapp	5.30, 5.30, 5.30, 5.30, 5.22, 5.25
Grenadine syrup, Giroux	2.31
Guava jelly, com.	3.73
Guava Nectar (pulp, juice, fruit acids, sugar, water), Hawaii	2.65
Guavas, canned	3.70
Haddock, filet, broiled	6.48, 6.21, 6.17, 6.82, 6.40, 6.47
Ham, fresh, baked	5.90, 6.10, 6.55
Ham, smoked, baked	5.80, 5.80, 5.80
Ham, smoked, boiled	6.23
Hamburger, broiled	6.22, 6.23
Hominy grits, cooked	5.99, 6.00, 6.02, 6.20, 6.02, 6.07
Honey	3.70, 3.90, 3.78, 3.78, 3.75, 3.75
Horseradish, freshly ground	5.35
Horseradish, prepared, com.	3.56
Huckleberries, cooked with sugar	3.38, 3.43
Junket-type dessert:	
Raspberry	6.27
Vanilla	6.49
Kale, cooked	6.70, 6.77, 6.80, 6.38, 6.38, 6.40
Karo syrup	4.50
Ketchup, com.	3.89, 3.92
Kippered herring, Marshall	6.10, 5.87, 6.10, 6.17, 6.14, 6.17
Kohlrabi, cooked	5.72, 5.72, 5.72, 5.82, 5.82, 5.78
Kumquats, Florida	3.70, 4.25, 3.80, 3.64, 4.03, 3.68
Lamb chops (rib), broiled	5.25, 6.57, 6.00, 5.55, 6.00
Lamb kidneys, broiled	6.51, 6.30
Lamb, rack, roasted	6.55
Lamb with vegetables, chopped, Clapp	5.98, 6.01, 6.01, 6.01, 5.90, 5.90
Leeks	5.77, 5.97, 5.51, 6.07, 5.72, 5.62
Leeks, cooked	6.12, 5.79, 6.05, 6.05, 6.05, 6.16
Lemon juice	2.05, 2.05, 1.98, 2.10, 2.05, 2.05
Lemon juice, canned	2.32
Lentils, cooked	6.83, 6.32, 6.36, 6.32, 6.35, 6.32
Lettuce, Boston	6.05, 6.09, 5.89, 5.98, 6.00, 5.92
Lettuce, iceberg	6.00, 5.70, 5.70, 6.06, 6.13, 6.00

Item.	pH
Lime juice	2.10, 2.00, 2.00, 2.11, 2.15, 2.25
Limequat juice	2.50, 2.45, 2.42, 2.44, 2.51, 2.40
Liver soup, Clapp	5.60, 5.60, 5.60, 5.60, 5.58, 5.59
Liver with vegetables, Clapp	5.29, 5.31, 5.31, 5.31, 5.46, 5.46
Liverwurst	5.40, 5.60, 5.72, 5.75, 5.72, 5.82
Lobster, cooked	7.26, 7.30, 7.17, 7.43, 7.28, 7.10
Macaroni, boiled	6.39, 6.41, 5.60, 6.00, 5.10, 6.00
Mackerel, king, broiled	6.50, 6.43, 6.47, 6.26, 6.33, 6.37
Mackerel, Spanish, broiled	6.36, 6.07, 6.14, 6.22, 6.10, 6.20
Maltex (1:8, cooked ½ hour)	5.81, 5.85, 5.89, 5.90, 5.80, 5.90
Mangoes, Florida	3.40, 4.43, 3.97, 4.41, 4.63, 4.17
Maple syrup	5.15
Matzos	5.70
Melba toast	5.08, 5.30
Melons, Casaba	5.90, 5.78, 5.57, 5.62, 5.58, 6.00
Melons, honey dew	6.43, 6.00, 6.42, 6.67, 6.28, 6.50
Melons, Persian	6.30, 6.23, 6.09, 5.90, 6.29 6.38
Milk, Grade A (New York)	6.68, 6.68, 6.68
Milk, Grade B (New York)	6.62, 6.69, 6.70, 6.77, 6.68, 6.25
Milk, acidophilus	4.13, 4.25, 4.15, 4.15, 4.09, 4.09
Milk, condensed	6.33
Milk, evaporated	6.01, 6.10, 6.11, 6.13, 6.11, 5.98
Milk, goat's	6.48
Milk, peptonized	7.10
Milk, sour, fine curd	5.65, 5.50
Milk, sour, precipitated curd	5.10, 4.70
Mint jelly, com.	3.01
Molasses	5.63, 4.67, 5.20, 5.27, 5.32, 5.32
Mushrooms, cooked	6.21, 6.20, 6.17, 6.18, 6.18, 6.22
Mushroom soup, cream of, canned	5.95
Mussels	6.20, 6.35, 6.58, 6.85, 6.85, 6.60
Mustard, prepared, com.	3.55
Nectarines	4.18, 3.94, 3.92, 3.97, 3.92, 4.06
Noodles, boiled	6.21, 6.30, 6.08, 6.08, 6.30, 6.50
Oatmeal (1:8, cooked ½ hour)	6.30, 6.29, 6.28, 6.20, 6.20, 6.00
Okra, cooked	6.42, 6.57, 6.42, 6.57, 6.62, 6.41
Olives, green	3.38, 4.00
Olives, green, ripe	6.80
Olives, ripe, processed	6.00
Onions, red	5.32, 5.41, 5.39, 5.39, 5.52, 5.39
Onions, white	5.48, 5.37, 5.50, 5.59, 5.85, 5.71
Onions, yellow	5.32, 5.47, 5.58, 5.42, 5.32, 5.60
Onions, pickled	2.71
Oranges, Fla., "color added," Pinellas County	3.90, 3.60, 3.60, 3.63, 3.67,. 3.75
Oranges, Fla., not colored, Phillipi River	3.93, 3.69, 4.34, 3.60, 3.88 3.97
Orange juice, California	4.19, 3.90, 3.59, 3.85, 3.63 4.34
Orange juice, Florida	4.15, 3.97, 3.30, 3.58, 3.33, 3.40
Orange marmalade, com.	3.00, 3.20, 3.23, 3.33, 3.16, 3.14
Oyster plant, cooked	5.72, 5.80, 5.75, 5.80, 5.75 5.79
Oysters	5.72, 6.10, 6.02, 5.98, 6.17, 5.68
Papaya	5.62, 5.72, 5.50, 5.39, 5.50, 5.20
Papaya marmalade, com.	4.00, 3.53
Parsley	5.82, 5.97, 6.03, 5.90, 5.92, 5.78
Parsnips, cooked	5.45, 5.50, 5.65, 5.40, 5.60 5.61
Passion Fruit Nectar (pulp, juice, fruit acids, sugar, water), Hawaii	2.80
Pâte de foie, American	5.90
Peaches	4.05, 3.39, 3.50, 3.30, 3.62, 3.66
Peaches, cooked with sugar	3.55, 3.72
Peaches, frozen	3.30, 3.30, 3.28, 3.35, 3.27, 3.32
Peaches, canned	3.80, 3.74, 3.73, 3.82, 3.75, 3.70
Peach Nectar (pulp, juice, sugar, water), com.	4.03
Peanut butter	6.28
Pears, Bartlett	4.08, 4.00, 4.00, 3.90, 3.87, 3.92
Pears, Royal Riviera, Oregon	4.48, 4.03, 4.40, 4.35
Pears, sickle, cooked with sugar	4.21, 4.20, 4.10, 4.05, 4.04, 4.09

Item	pH
Pears, canned	4.07, 4.03, 4.03, 4.08, 4.00, 4.03
Pear Nectar (pulp, juice, sugar, water), com.	4.13
Pea soup, cream of, canned	5.72
Peas, cooked	6.88, 6.61, 6.83, 6.22, 6.35, 6.31
Peas, frozen, cooked	6.62, 6.70, 6.40
Peas, canned	6.00, 5.90, 5.85, 5.71, 5.81, 5.81
Peas, puréed, Stokely	4.90, 5.72, 5.85, 5.72, 5.75, 5.75
Peas, strained, Clapp	5.91, 6.10, 5.97, 6.12, 6.00, 6.08
Peas, dried (split green), cooked	6.80, 6.50, 6.53, 6.49, 6.45, 6.57
Peas, dried (split yellow), cooked	6.62, 6.50, 6.47, 6.45, 6.43, 6.45
Pep	5.85, 5.39, 5.45, 4.49, 4.92, 5.02
Peppers, green	5.23, 5.20, 5.93, 5.48, 5.59, 5.54
Persimmons	5.42, 5.50, 5.81, 5.55, 5.50, 5.40
Pettijohn's (1:8, cooked ½ hour)	6.29, 6.29, 6.30, 6.26, 6.30, 6.30
Pimento, canned	4.65
Pineapple	3.38, 3.62, 3.27, 3.20, 3.64, 3.57
Pineapple, canned	3.42, 3.50, 3.47, 3.42, 3.40, 3.39
Pineapple juice, canned	3.37, 3.50, 3.52, 3.50, 3.55, 3.60
Plums, blue	3.39, 2.86, 2.78, 3.10, 2.95, 3.24
Plums, Damson	3.08, 3.00, 2.90, 3.00, 3.10, 2.95
Plums, green gage	3.60, 3.95, 3.62, 4.23, 4.29, 3.85
Plums, green gage, canned	3.29, 3.22, 3.26, 3.22, 3.22, 3.32
Plums, red	4.95, 3.62, 4.02, 5.28, 3.78, 4.59
Plums, yellow	4.45, 4.12, 4.15, 4.18, 4.63, 3.90
Plums, frozen	3.29, 3.22, 3.42, 3.30, 3.32, 3.29
Plums, spiced, com.	3.64
Plum Nectar (pulp, juice, sugar, water), com.	3.45
Pollack, filet, broiled	6.72, 6.82
Pomegranate	3.00, 3.10, 3.03, 2.98, 2.93, 2.96
Porgy, broiled	6.47, 6.43, 6.49, 6.43, 6.40, 6.40
Pork chop, broiled	6.53, 5.99
Pork tenderloin, fresh, baked	6.83, 6.42
Potatoes, see Table 62.	
Prunes, dried, stewed	3.84, 3.92, 3.72, 3.72, 3.76, 3.69
Prunes, chopped, Clapp	3.68, 3.68, 3.65, 3.64, 3.75, 3.75
Prunes, puréed, Stokely	3.82, 3.83, 4.00, 3.63, 3.60, 3.60
Prunes, strained, Clapp	3.68, 3.83, 3.68, 3.68, 3.75, 3.75
Prune juice, home-made	3.97, 3.96, 3.97, 3.95, 3.95, 3.97
Prune juice, com.	3.78
Puffed Rice	6.27, 6.40, 6.27, 6.34, 6.34, 6.20
Puffed Wheat	5.61, 5.58, 5.77, 5.70, 5.32, 5.26
Quince, fresh, stewed	3.37, 3.12, 3.16, 3.20, 3.20, 3.22
Quince jelly, com.	3.70
Radishes, red	5.85, 5.90, 6.05, 5.98, 6.04, 6.03
Radishes, white	5.58, 5.61, 5.69, 5.57, 5.52, 5.52
Raisins, seedless	4.10, 3.80
Ralston (1:8, cooked ½ hour)	6.19, 6.21, 6.24, 6.35, 6.30, 6.19
Raspberries, California	3.70, 3.88, 3.91, 3.62, 3.93, 3.95
Raspberries, New Jersey	3.72, 3.50, 3.50, 3.74, 3.82, 3.60
Raspberries, frozen	3.22, 3.18, 3.21, 3.20, 3.26, 3.22
Raspberry jam, com.	2.87, 3.06, 3.07, 3.10, 3.17, 3.08
Red pepper relish, com.	3.62, 3.10
Rhubarb, California, stewed	3.27, 3.34, 3.26, 3.24, 3.27, 3.20
Rice, brown, cooked	6.25, 6.42, 6.47, 6.60, 6.70, 6.83
Rice, white, cooked	6.50, 6.68, 6.15, 6.20, 6.00, 6.38
Rice, wild, cooked	6.08, 6.23, 6.30, 6.33, 6.47, 6.33
Rice Krispies	5.70, 5.73, 5.42, 5.60, 5.40, 5.41
Rolls, white	5.52, 5.52, 5.46
Romaine	5.90, 5.78, 5.98, 5.92, 6.06, 6.06
Salmon, fresh, boiled	6.85
Salmon, fresh, broiled	6.38, 6.38
Salmon, red Alaska, canned	6.17, 6.07, 6.07, 6.10, 6.16, 6.16
Sardines, Portuguese, in olive oil	5.72, 5.42, 5.77, 5.79, 5.93, 5.90
Saltines	6.89, 6.05, 6.00, 6.80, 6.70, 6.10
Sauerkraut, cooked	3.50, 3.45, 3.46, 3.45, 3.47, 3.47
Sausage, pan-broiled	6.74, 6.50

Item.	pH
Scotch broth, com.	5.92
Shad roe, sautéd	5.90, 5.90, 5.87, 5.87, 5.70, 5.83
Shallots, cooked	5.60, 5.70, 5.62, 5.60, 5.53, 5.60
Sherbet, raspberry, com.	3.69
Shredded Ralston	5.50, 5.49, 5.50, 5.53, 5.32, 5.60
Shredded Wheat	6.05, 6.05, 6.38, 6.20, 6.18, 6.49
Shrimp, boiled	7.39, 7.40, 7.19, 7.41, 7.79, 7.45
Smelts, sautéd	6.67, 6.76, 6.87, 6.90, 6.76, 6.86
Soda crackers	6.83, 5.65, 6.40, 7.08, 7.32, 7.08
Sorrel	3.27, 2.98, 3.20, 3.13, 3.13, 3.01
Sorrel, cooked	3.60, 3.72, 3.78, 3.80, 3.65, 3.49
Soy sauce, Chinese	4.70, 4.30
Spaghetti, cooked	6.40, 6.40, 6.17, 6.27, 5.97, 6.27
Spinach, cooked	7.10, 7.18, 6.60, 6.60, 6.60, 6.65
Spinach, frozen, cooked	6.52, 6.37, 6.47, 6.33, 6.30, 6.35
Spinach, chopped, Clapp	5.52, 5.52, 5.51, 5.52, 5.38, 5.40
Spinach, puréed, Stokely	5.50, 5.98, 6.22, 5.75, 5.78, 5.78
Spinach, strained, Clapp	5.70, 5.70, 5.70, 5.70, 5.63 5.63
Spiritus frumenti	4.15
Squash, acorn, cooked	5.61, 5.69, 6.12, 6.49, 5.65, 5.18
Squash, Hubbard, cooked	6.15, 6.12, 6.15, 6.00, 6.20, 6.05
Squash, white, cooked	5.52, 5.58, 5.70, 5.60, 5.58, 5.70
Squash, yellow summer, cooked	5.94, 5.79, 6.00, 5.98, 5.85, 5.88
Strawberries, California	3.32, 3.50, 3.49, 3.49, 3.45, 3.33
Strawberries, frozen	3.32, 3.27, 3.22, 3.22, 3.25, 3.21
Strawberry jam, com.	3.00, 3.40, 3.33, 3.36, 3.40, 3.36
Sweetbreads broiled	6.70, 6.60, 7.10
Swiss chard, cooked	6.78, 6.28, 6.25, 6.25 6.30, 6.17
Tangerines	4.48, 4.43, 3.93, 4.47, 3.97, 3.32
Tomatoes	4.22, 4.75, 4.32, 4.35, 3.99, 4.19
Tomatoes, local, vine-ripened	4.45, 4.17, 4.17, 4.08, 4.12, 4.02
Tomatoes, canned	4.28, 4.10, 4.14, 4.14, 4.14, 4.23
Tomatoes, strained, Clapp	4.18, 4.13, 4.13, 4.13, 4.12, 4.12
Tomato juice, canned	4.10, 4.11, 4.14, 4.14, 4.28, 4.28
Tomato paste, Italian	4.12
Tomato purée, com.	4.10, 4.17, 4.10, 4.10, 4.19, 4.10
Tomato soup, cream of, canned	4.62
Tongue, smoked, boiled	6.28, 5.90, 5.77
Trout, sea, sautéd	6.32, 6.30, 6.33, 6.20, 6.27, 6.23
Tuna fish, canned	6.10, 6.10, 5.92, 6.12, 6.02, 6.00
Turnip greens, cooked	5.91, 5.96, 6.30, 6.21, 6.25, 6.17
Turnips, white, cooked	5.82, 5.76, 5.85, 5.65, 5.64, 5.85
Turnips, yellow, cooked	5.73, 5.75, 5.70, 5.82, 5.67, 5.57
Turkey, roasted	6.80, 6.43, 5.90, 5.72, 7.00, 6.63
Veal chop, broiled	6.12, 5.90
Veal cutlet, breaded	6.80, 5.90
Veal kidneys, broiled	6.60, 6.48
Veal, roasted	6.99, 6.74
Vegetable soup, canned	5.16
Vegetable soup, chopped, Clapp	5.00, 5.00, 5.00, 5.00, 5.00, 5.00
Vegetable soup, strained, Clapp	5.00, 5.00, 5.00, 5.00, 4.99, 4.99
Vermicelli, cooked	6.50, 6.20, 6.38, 6.40, 5.80, 5.93
Vinegar, cider	3.12
Walnuts, English	5.42
Watercress	5.88, 5.89, 5.89, 6.10, 5.90, 6.18
Watermelon	5.30, 5.25, 5.60, 5.18 5.38, 5.29
Wheat Krispies	5.42, 5.62, 4.99, 4.99 5.01, 4.95
Wheatena (1:8, cooked ½ hour)	5.85, 5.85, 5.80, [illegible] 6.03, 6.06
Wheaties	5.10, 5.12, 5.09
Worcestershire sauce	3.63, 3.63, 3.67 [illegible] 3.63, 3.65
Yams, cooked	6.81, 5.79, 5.80 5.81 5.97, 6.55
Yeast, Fleischmann's	5.65
Youngberries, frozen	3.10, 3.00, 3.05 3.07 [illegible], 3.00
Zucchini, cooked	5.79, 5.15, 6.10 6.00, 5.89, 5.99
Zwieback	4.94, 4.87, 4.84, 4.90

TABLE 33.—pH of Reciped Foods and Soda Fountain Items.*

Item	pH
Barley soup	5.63
Bisque tortoni	6.33
Blanc mange	6.33
Bread pudding, plain	6.40
Bread pudding, chocolate	6.40
Broth, beef, clear	5.54, 6.10
Broth, beef, with rice	6.10, 5.62
Broth, chicken	6.21
Broth, G. Washington's Aces	6.48
Butterscotch sauce	5.20
Cake, plain	6.89
Celery, creamed	6.00
Celery soup, cream of	6.30
Cheese Fondue	5.35
Cheese rarebit	5.08, 5.04
Chocolate sauce	5.42
Chow mein, beef	5.76
Chocolate beverage (⅔ milk and ⅓ cream)	6.28, 6.32
Chocolate beverage (condensed milk)	6.03
Cider, sweet, com.	3.38
Cider, sweet, Sterling, sparkling	3.52, 3.62
Clam chowder, Manhattan	5.20
Club soda, "supercharged"	4.20
Boiled to remove CO_2	7.55
Cocoa beverage	6.45, 6.48
Cocoa cream, Hoffman	4.95
Coca Cola, bottled, N. Y. C.	2.40, 2.65, 2.30, 2.56, 2.60, 2.58
Coca Cola, fountain:	
Plain	2.46
With fresh lemon	2.38
Plain	2.62
With fresh lemon	2.42
Lemon juice used	2.28
Coffee, clear	4.83, 4.74, 4.83, 5.04, 4.78, 4.80
Coffee, clear	4.97
With 20% cream	5.62
With milk	6.00
With evaporated milk	6.00
Coffee, clear	5.00
With 40% cream	5.25
Coffee, Barrington Hall (soluble):	
Clear	5.40
With cream	5.90
Clear	5.32
With cream	5.78
Clear	5.40
With condensed milk	6.20
Coffee, G. Washington's Aces (soluble):	
Clear	5.20
With cream	5.78
Clear	5.22
With milk	6.01
Clear	5.18
With condensed milk	6.10
Coffee, Sanka	5.40
Corned beef hash (with potatoes)	5.26
Corn soup, cream of	6.18
Custard, baked	6.75, 6.80, 6.70
Eggnog	6.88
Eggs, omelette	7.70

* Bridges and Mattice: Am. Jour. Digest, Dis., 7, 440, 1939.

Item.	pH
Eggs, scrambled (milk and butter)	7.23, 7.34
Frosted drinks:	
Chocolate	6.33, 6.53
Strawberry	5.82
Ginger Ale, Canada Dry	2.75, 2.71, 2.76, 2.78, 2.78, 2.68
Ice-cream, plain mix (tested at Horton plant)	6.68
Ice-cream, chocolate mix (tested at Horton plant)	6.42
Ice-cream:	
Banana	6.00
Black raspberry	5.08, 5.15, 5.25
Caramel pecan	6.18
Cherry	6.18, 6.13, 6.11, 6.12, 6.05, 6.16
Chocolate	6.42, 6.59, 6.68, 6.49, 6.88
Coffee	6.23
Lemon	6.58
Strawberry	5.42, 5.32, 5.60, 5.67
Vanilla	6.05, 6.34, 6.25, 6.40, 6.53
Ice-cream sodas:	
Chocolate	5.62, 5.80
Coffee (whipped cream)	5.88
Pineapple (no milk)	4.85
Strawberry, plain	4.75
Same with milk	5.20
Ices:	
Cherry	3.08
Orange	2.82
Lemon beverage, Hoffman	2.82
Lemonade	2.75, 2.70
Limeade	2.56
Malted Milk, chocolate	6.48
Malted Milk, chocolate (thick)	6.52
Malted Milk, chocolate, with egg	6.70
Muffins, bran	6.52
Mushroom soup, cream of	6.20
Noodle soup	6.07
Orangeade	3.82, 3.85
Orange juice base	3.75
Pa-pi-a, Vanti	3.05, 3.17
Pea soup, cream of	6.17
Pea soup, split green	6.05, 6.00
Pepsi-Cola	2.20
Postum, beverage	5.52
Postum, beverage, clear	5.42
With 20% cream	6.05
With evaporated milk	6.17
With milk	6.23
Postum, beverage, clear	5.35
With 40% cream	6.20
Potatoes, Idaho, baked (with butter)	6.20, 6.40, 5.82, 6.03, 5.88, 5.90
Potatoes, Irish, baked (with butter)	5.23, 5.62, 6.30, 5.78, 6.02, 5.80
Potatoes, Irish, baked (with milk)	5.90, 5.98, 5.90, 5.92, 6.15, 6.18
Potatoes, Irish, boiled	5.58, 5.65, 5.91, 5.80, 6.02, 5.28
Potatoes, Irish, boiled (with milk)	6.03, 6.00, 5.93, 6.08, 6.22, 5.70
Potatoes, Irish, mashed (with milk and butter)	5.83, 5.93, 5.90, 5.90, 5.80, 5.89
Potatoes, sweet, baked (with butter)	5.35, 5.31, 5.29, 6.20, 5.70
Potatoes, sweet, boiled (with butter)	6.00, 5.88, 6.04, 5.98, 6.12, 5.98
Potatoes, sweet, canned	5.10
Rice pudding	6.41, 6.50, 6.50
Root Beer, Canada Dry	4.40
Russian dressing	4.08
Sarsaparilla	4.78
Scone, Scotch style	7.[illegible]
Spinach soup, cream of	6.21
Tamarind, brewed	2.75, 2.60, 2.82, 2.79, 2.78

Item.	pH
Tapioca pudding, caramel	6.16
Tea, Orange Pekoe type (weak)	6.97, 6.83, 5.30, 5.60, 6.10, 6.65
Tea, Orange Pekoe type (medium)	6.54, 6.43, 5.27, 5.18, 6.25, 6.04
Tea, Orange Pekoe type (strong)	5.76, 5.90, 5.13, 4.98, 6.25, 5.79
Tea, clear	5.80
With lemon	3.40
With 40% cream	5.90
Tea, clear	5.27
With lemon	4.40
With 20% cream	6.25
With evaporated milk	6.30
With milk	6.43
Tomato soup, cream of	5.62
Vegetable soup	5.40, 5.45
Vegetable and barley soup	4.47
Vegetable-okra soup	5.05
Water, Kalak	6.55
Water, Sparkling, Canada Dry	5.35, 5.46, 5.35, 5.28, 5.50, 5.42
Water, "White Rock"	4.90, 4.76, 4.36, 4.22, 4.90

Although difference in pH might be expected from sample to sample of the same item, remarkably little is encountered. For instance, the pH of Welsh rarebit removed from the hospital dining room was found to be 5.04 and nine months later a similar item was pH 5.08. Also, two bottles of grape juice of different brands both rated pH 3 and 3.05, 3.06 on dilution 1:1 with water, the tests being conducted over a year apart. These and similar observations would point to considerable consistency in the reaction of foods unless, of course, spoilage occurs.

Acid Activity.—Unfortunately acid concentration when directly expressed involves mathematical forms which are confusing to the uninitiated because of the smallness of the value stated. The term, pH, has become increasingly popular without many who use it being aware of its real nature. One is dealing with the logarithmic function of the hydrogen-ion concentration, not with some simple arithmetic value easy to compare. To remedy this difficulty, conversion tables follow and the name *Acid Activity* is given to the new term. It must be stressed that the term has no meaning with reference to these or any other data except as specifically stated. If the *Acid Activity* is multiplied by 10^{-7} (that is, 0.000 000 1), the result will approximate hydrogen-ion concentration in gram-equivalents per liter.

To conserve space, Table 34 presents data only at 0.1 pH intervals. Where closer readings are desired, Table 35 shows the variation encountered with changes of 0.01 pH. Since the "whole number" in the pH value designates merely the position of the decimal point, the corresponding *acid activity* can be obtained by using the numerical sequence in Table 35 and placing the decimal as indicated in Table 34. For example, *acid activity* for a sample of plum juice at pH 4.32 is desired. The 4 is ignored and the 32 is found in Table 35 under 6.32 as equivalent to 4.786. Since pH 4.32 lies between 4.3 and 4.4 which are 501.2 and 398.1 respectively, its *acid activity* becomes 478.6 or approximately 480.

TABLE 34. Acid Activity* Over pH Range of Foods Reported†

pH	Acid activity.	pH	Acid activity.	pH	Acid activity.
9.0	0.010	6.6	2.51	4.2	631.0
8.9	0.013	6.5	3.16	4.1	794.4
8.8	0.016	6.4	3.98	4.0	1,000.0
8.7	0.020	6.3	5.01	3.9	1,259.0
8.6	0.025	6.2	6.31	3.8	1,585.0
8.5	0.032	6.1	7.94	3.7	1,995.0
8.4	0.040	6.0	10.00	3.6	2,512.0
8.3	0.050	5.9	12.59	3.5	3,162.0
8.2	0.063	5.8	15.85	3.4	3,981.0
8.1	0.079	5.7	19.95	3.3	5,012.0
8.0	0.100	5.6	25.12	3.2	6,310.0
7.9	0.126	5.5	31.62	3.1	7,944.0
7.8	0.159	5.4	39.81	3.0	10,000.0
7.7	0.200	5.3	50.12	2.9	12,590.0
7.6	0.251	5.2	63.10	2.8	15,850.0
7.5	0.316	5.1	79.44	2.7	19,950.0
7.4	0.398	5.0	100.00	2.6	25,120.0
7.3	0.501	4.9	125.90	2.5	31,620.0
7.2	0.631	4.8	158.50	2.4	39,810.0
7.1	0.794	4.7	199.50	2.3	50,120.0
7.0	1.000	4.6	251.20	2.2	63,100.0
6.9	1.259	4.5	316.20	2.1	79,440.0
6.8	1.585	4.4	398.10	2.0	100,000.0
6.7	1.995	4.3	501.20	1.9	125,900.0

* If the decimal point of *Acid Activity* is moved seven places to the left, the resultant value will be hydrogen-ion concentration (g. per liter).

† Bridges and Mattice: Am. Jour. Digest. Dis., **7**, 440, 1939.

TABLE 35. Variation in Acid Activity* Over a pH Unit.†

pH	Acid activity.	pH	Acid activity.	pH	Acid activity.	pH	Acid activity.
7.00	1.000	6.75	1.778	6.50	3.162	6.25	5.623
6.99	1.023	6.74	1.820	6.49	3.236	6.24	5.754
6.98	1.047	6.73	1.862	6.48	3.311	6.23	5.888
6.97	1.072	6.72	1.906	6.47	3.389	6.22	6.026
6.96	1.097	6.71	1.950	6.46	3.467	6.21	6.166
6.95	1.122	6.70	1.995	6.45	3.548	6.20	6.310
6.94	1.148	6.69	2.042	6.44	3.631	6.19	6.467
6.93	1.175	6.68	2.089	6.43	3.715	6.18	6.607
6.92	1.202	6.67	2.138	6.42	3.802	6.17	6.761
6.91	1.230	6.66	2.188	6.41	3.890	6.16	6.918
6.90	1.259	6.65	2.239	6.40	3.981	6.15	7.080
6.89	1.288	6.64	2.291	6.39	4.074	6.14	7.244
6.88	1.318	6.63	2.344	6.38	4.169	6.13	7.413
6.87	1.349	6.62	2.399	6.37	4.266	6.12	7.586
6.86	1.380	6.61	2.455	6.36	4.365	6.11	7.7[illegible]
6.85	1.413	6.60	2.512	6.35	4.467	6.10	7.944
6.84	1.446	6.59	2.570	6.34	4.571	6.09	8.128
6.83	1.479	6.58	2.630	6.33	4.677	6.08	8.318
6.82	1.514	6.57	2.692	6.32	4.786	6.07	8.511
6.81	1.549	6.56	2.754	6.31	4.898	6.06	8.710
6.80	1.583	6.55	2.818	6.30	5.012	6.05	8.913
6.79	1.622	6.54	2.884	6.29	5.129	6.04	9.120
6.78	1.660	6.53	2.951	6.28	5.248	6.03	9.333
6.77	1.698	6.52	3.020	6.27	5.370	6.02	9.550
6.76	1.738	6.51	3.090	6.26	5.495	6.01	9.772

* If the decimal point of *Acid Activity* is moved seven places to the left, the resultant value will be hydrogen-ion concentration (g. per liter).

† Bridges and Mattice: Am. Jour. Digest. Dis., **7**, 440, 1939.

To answer a question such as how much more acid is the pH 2.0 of lime juice than the pH 3.6 of orange juice.—From Table 34 it will be seen that lime juice is roughly forty times as acid as orange juice since their *acid activities* are 100,000 and 2512 respectively.

If, then, anyone especially desires to have the "average" pH of any food from the series of determinations offered in Table 32, it will be necessary to compute the *acid activity*, average these numbers, then read back to the corresponding pH. All such data are approximations only.

Organic Acids in Foods.—According to Nelson, many erroneous statements regarding the incidence of specific acids in fruits have been retained in supposedly authoritative works. Malonic acid, for instance, is *not* found in fruits. Oxalic, benzoic, succinic and lactic acids never occur in large quantities. Despite reports to the contrary, Nelson insists that few fruits except the tamarind and grape (including raisins, of course), contain appreciable amounts of tartaric acid.

The two predominating acids in fruits and vegetables are malic and citric. The subsequent table which presents values for the acid components of a few fruits, vegetables, and miscellaneous foods is concerned, therefore, largely with these acids. The acidity of oranges, lemons, grapefruit, limes and most berries is almost entirely due to citric acid. This acid occurs free in tomatoes. Peaches, pears, and apricots contain malic as well as citric acid. Rhubarb, apples, and quinces owe their acidity to malic acid. Probably all the acid in cantaloupe is citric, that in watermelon malic (Bigelow and Dunbar). The "sand" seen in the sap of the sugar maple is calcium malate.

TABLE 36.—**Organic Acid Constituents of Foods.***

Food items.	Citric acid, per cent.	Malic acid, per cent.	Other acids
Apples:			
Crab	0.03	1.02	
Delicious	None	0.27	
Grimes' golden	None	0.72	
Jonathan	None	0.75	
McIntosh	None	0.72	
Rome beauty	None	0.78	
Winesap	Trace	0.50	
Yellow transparent	0.02	0.97	
Apricots, canned	1.06	0.33	
Dried	0.35	0.81	Trace of oxalic.
Artichokes	0.10	0.17	Trace of tartaric.
Asparagus	0.11	0.10	
Avocados	None	None	Trace of tartaric.
Bananas	..	0.24	
Bananas	0.15	0.50	
Bananas	0.32	0.37	
Barley	0.07		
Beans, lima	0.65	0.17	
String, green	0.03	0.13	
Beer	Trace		
Beets	0.11	None	
Blackberries	Trace	0.16	Traces of oxalic and succinic, 0.92% isocitric.
Blueberries	1.56	0.10	Trace of oxalic
Broccoli	0.21	0.12	
Brussels sprouts	0.24	0.20	
Cabbage	0.14	0.10	
Cantaloupe	..	None	
Carrots	0.09	0.24	
Cauliflower	0.21	0.39	
Celery	0.01	0.17	
Cherries	0.01	1.25	Trace of oxalic, 0.07% succinic, 0.13% lactic.
Cherries	None	0.56–1.99	
Cherries, Montmorency, canned	None	1.45	
Clams, hardshell, meat	None		
Liquor	None		
Cocoa	0.53		
Corn, sweet	None	None	
Crabs, soft shell	None		
Cranberries	1.82	0.46	0.07% benzoic.
Cranberries	1.10	0.26	Benzoic, 0.065%; quinic, 1% (Isham, 1935).
Cucumbers	0.01	0.24	
Currants	2.30	0.05	Traces of oxalic and succinic.
Currants, canned	1.92	0.13	
Eggplant	None	0.17	
Figs	0.34	Trace	
Gooseberry	Present	0.50–2.08	
Grapes	..	0.65	0.43% tartaric.
Juice, Concord	0.02	0.31	1.07% tartaric.
Grapefruit	1.46		
Grapefruit	1.33	0.08	
Kale	0.35	0.05	
Lemons	3.84	Trace	
Juice	6.08	0.29	

* Taken from Bigelow, W. D., and Dunbar, P. B., Jour. Ind. Eng. Chem., 9, 762, 1917. Nelson, E. K., Am. Med., 23 N.S., 812, 1928. Hartmann, B. G., and Hillig, F., Jour. Assn. Off. Agric. Chem., 17, 522, 1934. The total acidity of fruits varies with the degree of ripeness and the difference in variety.

TABLE 36.—Organic Acid Constituents of Foods.—*Continued.*

Food items.	Citric acid, per cent.	Malic acid, per cent.	Other acids
Lettuce, head	0.02	0.17	
Loganberries	2.02	0.08	
Canned	1.82	0.33	
Malt	0.13		
Milk, whole	0.16		
Evaporated	0.36		
Milk, powdered, whole	1.30		
Skimmed	1.82		
Mushrooms	None	0.14	
Okra	0.02	0.12	
Onions	0.02	0.17	
Oranges	0.98	Trace	
Oranges, Florida	0.92	0.18	
Oysters, meat	0.03	0.18	
Liquor	None	0.01	
Parsnips	0.13	0.35	
Peaches	0.37	0.37	
Canned	0.05	0.69	
Pears	0.24	0.12	
Pears, Bartlett, canned	0.42	0.16	
Peas, fresh	0.11	0.08	
Persimmons, Japanese	..	0.09	
Pineapple	0.84	0.12	
Pineapple	0.77	0.12	
Plum	..	0.36–2.39	
Plum, California	0.03	0.92	
Damson	None	2.48	
Pomegranate	4.52	None	
Potatoes, Idaho	0.51	None	
Potatoes, sweet (Cuban)	0.07	None	
Prunes, Italian style	None	1.44	
Pumpkin	None	0.15	
Quince	None	1.59	
Quince	..	0.68	Trace of tartaric.
Raspberries, black	1.06		
Black, canned	0.81	0.05	Trace of tartaric.
Red	1.30	0.04	
Red, canned	1.28	0.05	
Rhubarb	0.41	1.77	0.12% oxalic.
Scallops	None		
Shrimps	None		
Spinach	0.08	0.09	
Squash	0.04	0.32	
Strawberries	0.91	0.10	
Strawberries	1.08	0.16	
Tamarind	Trace	0.50	Traces of oxalic and succinic, 7.76% tartaric.
Tomatoes	0.30	0.20	
Tomatoes	0.47	0.05	
Turnips, white	None	0.23	
Watermelon		0.20	
Wheat, bran	0.08		
Wheat-germ	0.34		
Wheat flour (patent)	None		
Whole wheat flour	0.05		
Youngberries, canned	0.62	0.24	
Yeast, dried brewer's	0.30	..	(Sherman, 1936.)

TABLE 37.—**The Metabolic Reaction of Foods.**

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Acorns	..	13.6	1
Ale	..	2.4	1
All-Bran, Kellogg	4.3	..	5
Almonds	2.2	..	1
		18.3	5
		12.0	13
		12.4	10
Anchovies, salted	13.3	..	1
Apple dumpling	0.3	..	5
Sauce	..	4.5	13
Apples	..	3.7	10
		0.8–1.4	1
		2.3–3.0	5
Baked	..	2.4	5
Stewed	..	1.1	5
Apricots, fresh, raw	..	6.8	8
		8.4	5
		4.8	1
Cooked	..	8.5	13
Canned	..	6.9	5
Dried	..	41.9	5
		31.3	13
Cooked	..	17.4	5
Arrowroot starch	0.4	..	5
Artichokes, French or globe	4.3	..	1
Boiled	..	7.6	5
Jerusalem	..	10.3	1
Boiled	..	8.2	5
Asparagus	1.0	..	1
		0.8	10
Boiled	1.0	..	5
Avocados	..	10.7	10
Bacon, raw	5.0	..	13
	4.8–10.7	..	5
Cooked	10.0	..	13
Fried	12.9–40.8	..	5
Smoked	8.6	..	12
Bamboo shoots	..	7.7	14
Bananas	..	5.6	10
		7.9	5
		4.4	1
Barley, pearled	10.4	..	13
	17.5	..	5
	13.8	..	1
Boiled	6.0	..	5
Bass, steamed	15.0	..	5
Beans, baked	..	2.8	5
Broad, boiled	..	1.7	5
Butter, boiled	..	6.0	5
Raw	..	35.5	5
Haricot, boiled	..	5.0	5
Raw	..	25.5	5
Lima, fresh	..	14.0	9
Dried	..	41.6	10
Kidney, canned	..	3.0	13
Navy, canned	..	6.4	13
Dried	..	18.0	9
		23.9	6
Snap, raw	..	5.4	13
String	..	4.2	1
		5.4	9
White		4.1	1
	4.3		1

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Beef, blood	..	7.8	12
Boiled	25.2		5
Clear lean	12.0	..	9
Corned	13.7	..	5
Dried	14.8	..	13
Creamed	1.6	..	13
Heart	9.1	..	13
Juice	2.4	..	13
Lean	23.5	..	1
	13.9	..	10
Liver	10.1	..	13
Loin, med. fat	10.8	..	13
	38.6	..	1
Fat	9.5	..	13
Roast	19.0–23.5		5
Medium fat	8.1	..	1
Misc. fat-free cuts	11.5	..	13
Porterhouse	10.9	..	2
Ribs, med. fat	10.5	..	1
Cooked	13.8	..	1
Roast, fat	11.7	..	13
Round, lean	10.6	..	13
Steak	11.0	..	9
Steak, raw	18.5	..	5
Fried	17.3		5
Grilled	23.2		5
Stewed	28.9	..	5
Topside, boiled	28.9	..	5
Roast	20.4–22.2	..	5
Beef stew with pastry crust	8.8	..	5
With vegetables	..	2.0	13
Beer	0.3	..	1
Beets	..	10.9	10
		11.4	1
Boiled	..	8.9	5
Biscuit, baking powder	4.3	..	13
Blackberries	..	7.1	1
		8.4	5
Stewed	..	4.2	5
Blanc mange	..	2.3	5
Blueberry juice	..	2.8	14
Bologna	9.3	..	13
Bovril	..	51.0	5
Brains, calf, boiled	20.7	..	5
Sheep, boiled	17.7	..	5
Brazil nuts	10.9	..	1
		4.5	5
Bread, graham	6.8	..	13
Pumpernickel	..	4.3	1
Rye	6.8		13
Fine	2.6		12
Whole	6.0		12
White	2.7	..	6
	1.5	..	5
Fine	6.7	..	12
(Milk)	7.1	..	13
(Water)	6.0	..	9
	7.1	..	13
Whole wheat	7.3	..	13
	5.9	..	5
	3.0		6
Broccoli	..	3.6–4.9	3
Tops, boiled	..	4.3	5
Brussels sprouts	..	4.3	1
Boiled	..	0.8	5

TABLE 37.—The Metabolic Reaction of Foods. *Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Buckwheat, refined	7.3	..	1
Groats	3.8	..	1
Butter	0.4	..	5
	4.3	..	1
Buttermilk	..	2.2	13
		1.3	1
Cabbage	..	6.0	9
		4.3	10
		8.2	12
Spring, boiled	..	1.4	5
Winter, boiled	..	4.9	5
Cabbage, red	..	2.2	1
		5.6	5
Cabbage, Savoy	..	2.7	1
Boiled	..	2.8	5
Cakes:			
Chocolate	3.6	..	13
	2.9	..	5
Cocoanut	1.1	..	5
Currant	..	0.6	5
Gingerbread	..	8.7	5
Plain	4.3	..	13
Sponge	10.7	..	5
Cantaloupe	..	7.5	5, 9
Carp, cooked	19.5	..	1
Carrageen moss, dried	113.0*	..	5
Carrots	..	10.8	10
		9.5	1
Old, raw	..	9.0	5
Boiled	..	4.4	5
Young, boiled	..	5.9	5
Cauliflower	..	5.3	10
		3.0	1
		1.4	3
Boiled	..	1.7	5
Caviar	11.6	..	1
Celeriac, boiled	..	8.8	5
Celery, raw	..	8.4	5
		7.8	10
Blanched	..	11.1	1
Leaves and stalks	..	2.5	1
Celery, boiled	..	5.0	5
Chard	..	15.8	9
		24.6	14
Cheese, cheddar	5.5	..	13
	5.4	..	5
Cottage (Skim milk)	4.5	..	1
Cream (English)	3.4	..	5
Gorgonzola	0.3	..	5
Gruyère	17.5	..	1
		3.6	5
Hand	19.8	..	1
Parmesan	2.1	..	1
		5.1	5
Stilton	7.8	..	5
Cherries, black	..	2.6	1
Glacé	..	1.7	5
Sour	..	2.1	1
		6.1	13
Stewed	..	2.9	5
Sweet	..	2.7	1
		7.3	5

* Refer to page 259.

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Cherry juice	..	4.4	10
Chestnuts	..	7.4	10
		9.6	1
		11.3	5
Chicken, boiled	20.7	..	5
Broiler	10.8	..	13
Fat	24.3	.	1
Fowl, raw	9.6	..	13
Stewed	13.7	.	13
Roast	25.4	..	5
Salad	0.7	..	13
Chicory (coffee substitute)	..	7.2	1
Chicory, white	..	2.3	1
		4.1	5
Chives, leaves	..	8.3	1
		12.6	14
Chocolate	8.1	..	1
		7.9	5
Milk	..	8.4	5
Chocolate blanc mange	..	1.4	13
		2.6	5
Chutney, apple	..	4.6	5
Tomato	..	5.3	5
Cider, apple	..	4.4	1
Grape (unfermented)	..	5.2	1
Citron	..	9.8	9
Citron, fresh unripe	..	6.9	15
Citron, preserved	..	8.3	15
Cocoa, beverage	..	2.9	13
Powder	..	0.7	5
Cocoanut	..	7.0	2
		4.9	5
Shredded	..	4.2	13
		4.1	1
Dried	..	8.5	5
Cocoanut milk	..	7.5	5
Cod, fresh	5.5	..	13
Steamed	16.2	.	5
Fried	15.6	..	5
Grilled	21.8	..	5
Roe, fried	38.8	..	5
Baked in vinegar	40.0	..	5
Codfish, salt, raw	12.6	..	13
Cooked	21.0	..	13
Coffee, roasted	..	63.4	5
		5.6	1
Beverage	..	0	5
Cookies:			
Chocolate drop	0.6	.	13
Hermit	3.0	.	13
Sugar, plain	0.5	.	13
Corn, green	1.8	.	2
Sweet	1.8	..	13
Dried	6.0	..	10
Corn cake (Johnny cake)	4.1	.	13
Corn Flakes	5.4	..	13
	2.0	..	5
Cornmeal	6.5	..	1
Yellow, raw	5.4	..	13
Cooked	1.0	..	13
Cornstarch	0.0	0.0	
Blanc mange	..	1.6	13
Cornsalad	.	0.8	1
Crab, boiled	39.5	..	5

TABLE 37.—The Metabolic Reaction of Foods.—*Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Crackers	7.8	..	10
Cream	5.3	..	5
Graham	8.5	..	13
Saltines	8.2	..	13
Soda	8.2	..	13
Cranberries*	..	3.2	5
Cream	..	3.2	1
		1.9	5
		0.6	13
20%	..	0.4	13
40%	..	..	12
Cream of Wheat	10.2	31.5	1
Cucumbers, fresh	..	3.2	5
		7.9	9
Currant juice, red	..	4.9	14
Currants, red	..	1.1	1
		6.3	14
		5.9	5
Stewed	..	4.3	5
Black	..	3.2	1
		8.8	5
Stewed	..	6.1	5
White	..	4.4	1
		6.1	5
Fresh	..	0.7	13
Dried	..	5.8	13
		21.8	5
Custard, baked	0.5	..	5
Boiled	0.5	..	5
Custard apple	..	9.7	14
		11.9	5
Damsons	..	8.2	5
Dandelion greens	..	17.5	1
Dasheen	..	15.0	14
Dates	..	11.0	9
		12.4	5
		5.5	1
Dogfish, fried	20.5	..	5
Doughnuts	7.3	..	13
	1.7	..	5
Dressing, meat or poultry	1.7	..	13
Dripping, beef	1.1	..	5
Duck, roast	24.4	..	5
Dumpling	..	1.4	5
Eel	7.0	..	1
	9.9	..	10
Stewed	8.5	..	5
Egg, whole	11.1	..	10
	24.5	..	1
	16.2	..	5
Boiled	16.2	..	5
Fried	16.5	..	5
Poached	19.7	..	5
Scrambled	12.5	..	5
Egg, white	4.8	..	13
	5.0	..	5
	5.2	..	10
	8.3	..	1
Yolk	25.3	..	13
	33.2	..	5
	26.7	..	10
	51.8	..	1

* Ash alkaline *in vitro*, partly acid *in vivo*.

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Eggnog	10.0	..	1
Eggplant	..	4.5	5
Endive	..	14.5	1
		5.4	5
French	..	2.3	1
Farina, raw	9.6	..	13
Cooked	1.6	..	13
Figs, dried	..	100.9	13
		10.0	2
		36.1	5
		27.8	1
Stewed	..	20.5	5
Filberts	2.1	..	1
Fish paste	10.3	..	5
Flounder, steamed	19.7	..	5
Fried	13.9	..	5
Flour:			
Buckwheat	6.9	..	13
Corn	..	0.6	5
Graham	11.2	..	13
Rye	11.3	..	1
White	9.6	..	13
	7.4	..	5
Wheat	11.6	..	10
Coarse	2.7	..	1
Entire	12.0	..	9
Whole	12.2	..	13
	3.4	..	5
Force	3.8	..	5
Frankfurters	10.2	..	13
Frogs' legs	15.8	..	1
	10.6	..	10
Fruit salad, canned	..	3.3	5
Fudge, chocolate	..	0.4	13
Gelatin dessert, lemon	..	0.5	13
Ginger, ground	..	21.6	5
Gingerbread	..	8.7	5
		17.0	13
Goose	24.5	..	12
Young	7.7	..	13
Roast	21.8	..	5
Gooseberries	..	7.6	1
		3.3	14
Green, raw	..	4.1	5
Stewed	..	2.1	5
Ripe	..	3.7	5
Gooseberry juice	..	4.3	14
Grapes	..	2.7	13
Black	..	7.2	5
White	..	6.0	5
Grape juice	..	3.9	13
Grapefruit	..	6.4	5
Grapenuts	..	1.4	5
Gravy, meat stock	7.0	..	13
Greengages	..	7.7	5
Grouse, roast	25.8	..	5
Guava	..	7.7	14
Guinea-fowl, roast	26.3	..	5
Haddock	8.5	..	11
	16.1		10
Steamed	17.7		5
Fried	14.0		5
Haddock, smoked, steamed	19.7		5

TABLE 37.—The Metabolic Reaction of Foods.—*Continued*

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Hake, steamed	12.7	..	5
Fried	14.8	..	5
Halibut	9.4		13
	9.2		11
Steamed	18.6		5
Ham, boiled	10.0		13
Fresh, lean	12.5		13
Smoked, med. fat	8.3		13
Smoked	9.7		2
	7.0		1
York, raw	7.6		5
Boiled	16.2–22.3		5
Hare, roast	30.0	..	5
Stewed	28.1	..	5
Hash	2.6		13
Hazelnuts	2.1	..	1
	3.9	..	5
Heart, sheep, roast	27.6		5
Herring, fresh	12.7		1
Salt	17.4	..	1
Smoked	10.0	..	11
Fried	21.9	..	5
Baked in vinegar	23.8	..	5
Roe, fried	66.2	..	5
Honey, comb	1.1	..	5
Strained	..	0.6	5
Honey, dark:			
Average	..	2.1	4
Buckwheat	..	0.4	4
Catsclaw	..	1.9	4
Goldenrod	..	1.1	4
Mixed flowers	..	4.6	4
Tulip-popular	..	2.7	4
Honey, light:			
Average	..	1.0	4
Mesquite	..	3.2	4
Orange	..	0.5	4
Sage	..	0.6	4
Sweet clover	..	0.4	4
Tupelo	..	0.8	4
White clover	..	0.7	4
Horseradish	..	5.8	5
		2.7	1
Horse meat	6.9	..	1
Huckleberries	1.4	..	1
Hung-Toi (N. Y. C.)	..	14.3	14
Ice-cream, vanilla	..	0.5	13
		5.3	5
Jam, fruit with edible seeds	..	3.8	5
Stone fruit*	..	2.8	5
Jelly roll	..	0.5	5
Kale	..	4.0	12
		17.0	14
		8.3–12.7	3
Kidney, sheep, raw	15.7	..	5
Fried	31.0	..	5
Ox, raw	15.3	..	5
Stewed	30.3	..	5
Veal	8.4	..	13
Kohlrabi	..	6.0	1

* Plums are acidifying.

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Lamb, chops	9.3	..	13
Roast	10.7	..	13
Lard	1.6	..	5
	4.4	..	1
Leeks, bulbs	..	7.3	1
Boiled	..	5.5	5
Leaves	..	11.3	1
Lemonade	..	0.4	5
Lemons	..	5.5	10
		9.9	1
Incl. skin	..	8.5	5
Lemon juice	..	4.1	9
		3.8	5
Lentils, dried	5.2	..	13
		2.0	5
	17.8	..	1
Boiled	..	0.4	5
Lettuce	..	7.4	10
		14.1	1
		6.5	3
		6.8	14
		3.8	5
Lima, *see* Beans.			
Liver, beef, raw	10.1	..	13
calves', raw	9.4	..	13
	14.7	..	1
Raw	23.6	..	5
Calves', fried	49.5	..	5
Ox, fried	46.9	..	5
Lobster, boiled	38.4	..	5
Loganberries	..	7.4	5
Canned	..	2.5	5
Lotus, fresh	..	9.0	14
Macaroni, raw	9.6	..	13
	5.1	..	1
	3.8	..	5
Cooked	1.7	..	13
	1.2	..	5
Macaroni and cheese	..	2.1	13
		0.1	5
Mackerel	9.3	..	13
Fried	12.7	..	5
Mangos	..	5.0	14
Margarine	1.3	..	5
	7.3	..	1
Marmalade, orange	..	10.0	13
		2.8	5
Marmite (vegex)	..	17.1	5
Maté, dry leaves	..	25.5	1
Mayonnaise	1.4	..	13
Meat extracts	19.9-50.7	..	1
Meat paste	9.6	..	5
Milk:			
Skim	..	1.8	13
		2.9	5
Condensed	..	10.9	5
Top	..	1.2	13
Whole	..	1.8	13
		2.4	10
		2.7	5
		4.2	12

TABLE 37.—The Metabolic Reaction of Foods.—*Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Milk, Whole:			
Condensed	..	4.5	13
		8.4	5
Evaporated	..	4.6	13
Dried	..	21.6	5
Mincemeat	..	12.2	5
Molasses	..	59.4	13
See Treacle.			
Muffins (1 egg)	4.5	..	13
Mushrooms	..	4.0	9
		1.8	1
		4.0	5
Fried	1.6	..	5
Muskmelon	..	7.5	10
Mussels, boiled	28.7	..	5
Mustard	30.8	..	5
Mustard and cress	2.3	..	5
Mutton, chops, raw	4.5–12.1	..	5
Fried	6.2–16.6	..	5
Grilled	8.0–17.0	..	5
Leg	9.6	..	2
Boiled	22.5	..	5
Roast	19.9	..	5
Med. fat	20.3	..	1
Scrag and neck, stewed	20.3	..	5
Nectarines	..	6.2	5
Noodles	5.1	..	1
Oatmeal, raw	12.9	..	10
	13.2	..	5
Cooked	2.0	..	13
Porridge	1.5	..	5
Oatmeal cookies	0.6	..	5
Oats, hulled	10.0	..	12
Okra	..	4.5	1
Olive oil	..	< 0.1	5
Olives, green	..	41.1	13
		45.0	9
		47.2	8
Bottled in brine	3.8	..	5
Omelette	10.2	..	5
Cheese	14.0	..	5
Onions	..	1.5	13
		0.5	5
Boiled	..	0.2	5
Fried	..	1.6	5
Red	1.1	..	1
Spring, raw	..	8.4	5
Oranges	..	5.6	10
		6.1	5
		9.6	1
Orange juice	..	4.5	9
		4.5	5
Ovaltine	..	8.5	5
Ox-tongue	10.6	..	1
Oxo cubes	..	63.5	5
Oysters	15.0	..	9
	14.4	..	5
Solids and liquor	10.3	..	1
Pancakes	1.8	..	5
Parsnips	..	11.9	9
		6.6	1
Boiled	..	7.5	5
		6.7	5

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Partridge, roast	27.9	..	5
Passion fruit	..	8.5	5
Pastry	4.4	.	13
Flaky, baked	4.6	..	5
Short, baked	5.4	..	5
Peaches	..	5.0	10
		5.4	1
		6.1	5
Canned	..	3.8	5
Dried	..	12.1	5
Stewed	..	4.1	5
Peanuts	3.9	..	10
	11.6	..	5
	16.4	..	1
Peanut butter	4.4	..	13
Pears	..	3.3	1
		3.6	9
Eating	..	3.4	5
Cooking	..	2.2	5
Stewed	..	1.5	5
Canned	..	2.6	5
Peas, fresh	..	1.3	9
	2.3	..	1
		5.2	12
		1.2	5
Boiled	1.4	..	5
Canned	2.9	..	5
		1.3	13
Dried	..	5.0	9
		7.1	10
		10.3	5
Boiled	..	1.2	5
Split, dried	..	7.7	5
Boiled	0.5	..	5
Yellow	3.4	..	1
Pepper (condiment)	..	28.9	5
Perch	6.3	..	2
Pheasant, roast	21.6	..	5
Pies:			
Apple	..	1.6	13
	0.3	..	5
Cream	1.4	..	13
Custard	2.1	..	5
Gooseberry	..	0.4	5
Mince	..	1.2	5
Rhubarb	..	4.8	5
Pigeon, boiled	25.7	..	5
Roast	29.1	..	5
Pig's blood	..	4.9	12
Pike	11.8	..	10
	2.8		1
Sea, fresh	19.5	..	12
Pineapple, fresh	..	6.8	13
		3.6	1
		7.0	5
Canned	..	2.2	5
Plaice, fried	21.4	..	5
Steamed	18.4		5
Plums*		4.8	5
Pollack, fried	9.9		5
Steamed	12.4		5
Pomegranate juice		3.5	5
Poppy seeds	..	31.5	1

* Ash alkaline *in vitro*, partly acid *in vivo*.

TABLE 37.—The Metabolic Reaction of Foods.—*Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Pork, chops, lean	10.0	—	13
Grilled	7.7–18.7	—	5
Lean	11.9	..	10
Leg, roast	28.6	..	5
Loin, roast	11.6–17.0	..	5
Loin, salt, smoked, lean, cooked	27.4	..	5
Med. fat	8.3	..	13
	12.5	..	1
Salt	9.9	—	1
Sausage	6.4	—	13
Raw	2.5	..	5
Fried	3.6	..	5
Porter	..	2.1	1
Post Toasties	2.9	..	5
Potatoes, sweet, raw	..	6.7	9
Baked	..	7.9	13
Boiled	..	5.0	5
White	..	7.0	9
		7.3	12
(Old)	..	10.3	5
Baked	..	10.0	13
		12.4	5
Boiled, new	..	7.2	5
Old	..	5.3	5
Chips	..	18.0	13
		19.6	5
Creamed	..	4.5	13
Fried	..	7.2	13
Mashed	..	6.0	13
		5.1	5
Roast	..	12.8	5
Salad	..	6.0	13
Potato starch	..	0.3	1
Prickly pear	..	6.7	14
Prunes*	..	20.3	5
Stewed	..	7.8	5
Puddings:			
Rice	..	1.7	5
Sago	..	2.8	5
Semolina	..	1.7	5
Tapioca	..	2.4	5
Puffed Rice	9.0	..	13
Puffed Wheat	11.0	..	13
Pumpkin	..	7.8	5
		1.5	9
		0.3	1
Quaker Oats	17.6	..	1
Quince juice	..	3.7	14
Quinces	..	4.9	5
Rabbit	14.8	..	10
	22.4		1
Stewed	20.1	..	5
Radishes, red	..	2.9	10
		6.1	1
		7.2	5
White	..	3.1	1
Raisins	..	23.7	10
		27.0	5
Raspberries	..	5.3	1
		6.1	5
Stewed	..	4.1	5

* Ash alkaline *in vitro*, partly acid *in vivo*.

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Raspberry juice	..	4.9	10
		0.5	1
Rhubarb, fresh	..	8.6	13
		8.9	1
		13.0	5
Stewed	..	9.1	5
Rice, white	9.0	..	9
	8.1	..	10
	7.6	..	5
	5.7	..	12
Boiled	2.6	..	5
	2.5	..	13
Rice pudding	..	1.7	5
With raisins	1.5	..	13
Rice starch	3.2	..	1
Romaine	..	7.0	1
Rusk	..	5.9	5
Rutabagas	..	8.5	9
Rye	11.3	..	1
Ryvita	2.5	..	5
Sago	1.3	..	5
Salad dressing, boiled	1.9	..	13
Salmon, fresh	11.0	..	13
	8.3	..	1
Steamed	16.2	..	5
Canned	20.1	..	5
	10.8	..	13
Salsify, boiled	..	2.9	5
Sapodilla, Cuban	..	4.8	14
Sardines	11.4	..	13
Canned	26.5	..	5
Sauerkraut	..	5.7	13
Sausage, beef, fried	12.9	..	5
Black	4.4	..	5
Breakfast	2.0	..	5
Pork, raw	2.5	..	5
	6.4	..	13
Fried	3.6	..	5
Scallops, steamed	36.2	..	5
Scones (with egg)	2.6	..	5
(Without egg)	..	0.4	5
Sea-kale, boiled	1.0	..	5
Semolina	6.7	..	5
Shellfish	19.5	..	1
Shepherd's pie	1.4	..	5
Shortbread	4.6	..	5
Shredded Wheat	12.2	..	13
	5.7	..	5
Shrimps, cooked	1.6	..	5
Smelts	12.0	..	11
Fried	..	3.9	5
Sole	16.9	..	5
Fried	15.5	..	5
Sorghum	0.8	..	1
Soups:			
Cream of pea	..	0.9	13
Tomato	..	2.7	13
Potato	0.1	..	5
Vegetable	..	0.7	13
Soursop, Cuban	..	6.3	14
Soy bean, said to be highly alkaline.			
Soy sprouts	..	16.4	14
Spaghetti	9.6	..	13
Cooked	2.1	..	13

Table 37.—The Metabolic Reaction of Foods.—(*Continued.*)

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Spinach	..	27.0	8
		13.1	12
		5.1	1
		11.9–21.8	3
Boiled	..	39.6	5
Sprats, fried	8.5	..	5
Smoked, grilled	16.9	..	5
Spring greens, boiled	..	4.3	5
Squash, Hubbard	..	2.8	13
Steak, *see* Beef.			
Steak and kidney pie	14.0	..	5
Strawberries	..	3.5	5
		1.8	1
Sturgeon, steamed	26.1	..	5
Suet	0.6	..	5
Sugar, beet	..	9.4	1
Demerara	..	3.3	5
Raw brown (Barbados)	..	60.0	12
Refined white	..	< 0.1	5
Swamp cabbage, *see* Hung-toi.			
Swedes, raw	..	4.9	5
Boiled	..	2.6	5
Sweetbreads, stewed	11.7	..	5
Syrup, English golden	..	14.2	5
Tangerines	..	11.8	1
		5.3	5
Tapioca	1.2	..	5
Apple	..	2.2	13
Cream	..	0.5	13
Taro	..	15.0	14
Tea, dry leaves	..	53.5	1
Indian	..	46.5	5
Infusion	..	—	5
Toast, white	1.8	..	5
Whole wheat	7.0	..	5
Toffee, home-made	..	5.2	5
Tomato	..	5.6	5
		5.6	9
		13.7	12
Fried	..	6.8	5
Tongue, ox	10.6	..	1
Pickled	23.6	..	5
Sheep, stewed	18.7	..	5
Treacle, black	..	49.4	5
Tripe, stewed	8.1	..	5
Trout	8.9	..	13
Steamed	15.2	..	5
Trout, sea, steamed	22.1	..	5
Salmon	8.8	..	2
Truffles, white	5.9	..	1
Black	10.3	..	1
Turbot, steamed	18.4	..	5
Turkey, dark meat, raw	10.4	..	13
Cooked	19.3	..	13
Light meat, raw	12.7	..	13
Cooked	17.1	..	13
Turkey, roast	19.5	..	5
Turnips	..	2.7	10
		10.2	1
		6.5	5
Boiled		5.2	5
Turnip tops, boiled		2.3	5
Turnip-rooted cabbage		1.7	1

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Veal	13.5	..	10
	12.4		5
Chops, med. fat	9.8		13
Cutlet, fried	23.5		5
Fillet, raw	16.1	..	5
Roast	28.5	..	5
Loin	9.8	..	2
Med. fat	22.9	..	1
Roast	13.0	..	13
Vegetable marrow	..	1.9	5
Vegex	..	17.1	5
Venison, roast	23.8	..	5
Vinegar	..	1.2	5
Waffles	5.6	..	13
Waldorf salad	..	4.0	13
Watercress	..	5.0	1
		7.5	5
		11.7	14
Walnuts, English	9.2	..	1
	8.4	..	5
	7.9	..	13
Watermelon	..	2.7	9
		1.8	1
Waternuts	0.2	..	1
Welsh rarebit	2.8	..	5
Wheat, entire	12.0	..	9
	9.7	..	10
Wheat groats	10.2	..	1
Starch	8.0	..	1
Whelks, cooked	23.5	..	5
Whey	..	2.7	1
Whitefish	11.3	..	13
White sauce, med.	..	0.9	13
Whiting, fried	15.2	..	5
Steamed	16.4	..	5
Wines, white:			
Moselle and Saar	..	0.73	1
Rhinewine	..	0.27	1
Nahe Valley	..	0.31	1
Franconian	..	1.00	1
Bordeaux	..	1.30	1
Central Italy	..	0.91	1
Spanish	0.48	..	1, 7
Caucasian	..	1.60	1
California	..	1.21	1
Red:			
Rhenish Hesse	..	1.34	1
Rhine Valley	..	1.12	1
Ahr Valley	..	0.29	1
Bordeaux	..	1.43	1
Bohemian	..	0.67	1
Central Italy	..	0.70	1
Spanish	..	0.68	1
Caucasian	..	2.33	1
Algerian	..	2.23	1
California	..	0.19	1
Wines, sweet:			
Tokay	..	1.03	1
Sherry	..	0.51	1 (Konig)
Malaga	..	3.04	1
Wines, sparkling:			
Sparkling Tokay	..	0.49	1
French Champagne	..	0.96	1

TABLE 37.—The Metabolic Reaction of Foods. (*Concluded.*)

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Wines, fruit:			
Pear	..	3.64	1
Gooseberry, sweet	..	3.42	1
Whortleberry, extra old	..	1.56	1
Yorkshire pudding	2.8	..	5
Zwieback	10.4	..	1

SOURCE OF DATA FOR TABLE 37.

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CHAPTER 8.

THE MINERAL FAMILY.

ALTHOUGH classed as minor nutritive elements, the minerals have many vital functions to perform. Strictly speaking, they should not be discussed by themselves but as part of the larger metabolic picture. Their segregation here is a matter of convenience.

As pointed out by Underwood (1940), thirteen mineral elements are known to be essential to animal life, *viz.*, Ca, P, Mg, Na, K, Cl, S, Fe, Cu, Mn, Zn, I, and Co. The last five of these are usually referred to as "trace elements." Because of its *relatively* large daily requirement, iron is no longer placed in this category.

Calcium and magnesium as phosphate and carbonate are the chief inorganic constituents of bone and teeth with fluoride and silicon playing minor rôles. One of the essential elements of organic compounds composing the soft tissues is potassium. Soluble and ionized salts act as physiological catalyzers; they govern the condition of the body colloids and the movement of fluid; they affect the elasticity of muscle and the irritability of nerve; they produce and control the reaction of secretions. Increase in sodium or decrease in calcium in the surrounding fluid augments the irritability of the tissue. Sodium, potassium, and calcium concentrations are kept at fixed proportions for the maintenance of physico-chemical phenomena, such as the rhythmic beating of the heart. Ionic imbalance leads to altered permeability of membranes permitting escape of protein, or to retention of salt with consequent water-logging of the tissues. Not only the absolute concentrations of the inorganic elements, but also their ratios are of paramount importance to the proper function of the body.

Calcium.—Calcium salts from different food sources are not equally well utilized. This may be due in part to retention in cellulose fiber, but it is primarily dependent upon the presence of oxalic acid. Much plant calcium exists as the insoluble oxalate. Where the calcium is bound to protein, as in milk, it is obviously more available for absorption. Milk calcium is usually regarded as wholly assimilable. Judging by biologic experiments, the calcium of kale is almost as available as that in milk; this is attributed to the low oxalate content of kale. Spinach, on the other hand, is rich in oxalates. Investigations by Kohman (1939) indicate that spinach not only supplies no available calcium but also renders unavailable a considerable portion of that present in other foods ingested with the spinach. To provide assimilable calcium in the diet it is necessary to recognize the deleterious effect of oxalic acid. Table 38, therefore, presents specially assembled data with reference to these factors. The following additional items from earlier work are worth noting:

	Per cent.		Per cent.
Cocoa	0.45–0.49	Dried figs	0.10–0.12
Coffee, roasted	0.01–0.08	Ground pepper	0.32–0.46
Coffee, beverage	0.002	Poppy seeds	1.62
Tea, black	0.37–1.43	Sorrel	0.27–0.36
Tea, beverage	0.0044		

The possibility of nuts being a source of oxalic acid is apparent from analyses of Majumdar and De (1938): almonds 0.41 per cent, cashew nuts 0.32 per cent.

TABLE 38.—**The Calcium and Oxalate Content of Various Foods.***

Food items.	Calcium, per cent.	Oxalic acid, per cent.	Total solids per cent.
Apples, early summer	0.010	None	12.58
Apricots	0.024	0.014	13.62
Asparagus	0.0201	0.0052	6.05
Avocados	0.0095	None	14.60
Bananas	0.0071	0.0064	23.81
Beans, green pod	0.0440	0.0310	9.58
Lima	0.044	0.0043	24.25
Wax	0.054	0.041	7.80
Beets, unpeeled	0.018	0.138	8.23
Beet leaves	0.120	0.916	6.60
Beet stems	0.040	0.338	6.66
Blackberries	0.038	0.018	12.25
Blueberries	0.026	0.015	20.81
Broccoli, leaves and flowers	0.21	0.0054	10.50
Broccoli, stalks	0.092	0.0035	7.57
Cabbage	0.189	0.0077	8.80
Cabbage sprouts	0.150	0.0059	8.52
Cabbage, Chinese	0.210	0.0073	6.45
Cantaloupe	0.0090	None	8.46
Carrots	0.044	0.033	11.02
Cauliflower	0.034	None	8.90
Celery stalks, bleached	0.054	0.034	4.58
Celery, soup leaves	0.55	0.050	14.66
Celery, soup stems	0.18	0.062	10.20
Chard, Swiss, leaves	0.11	0.66	9.47
Chard, Swiss, stalks	0.045	0.29	7.10
Chard, Swiss, leaves and stalks	0.129	0.645	8.28
Chenopodium	0.099	1.11	8.20
Cherries, red sour	0.010	0.0011	12.18
Sweet, Bing	0.0019	None	24.50
Collards	0.361	0.0091	12.75
Corn, sweet, white	0.0076	0.0014	25.00
Yellow	0.0033	0.0052	33.51
Cress, land, wild	0.24	None	15.00
Cress, early, fine, curled	0.182	0.0106	8.80
Cucumbers	0.014	None	3.72
Currants, red	0.030	0.019	15.52
Dandelion greens	0.171	0.0246	11.38
Dewberries	0.027	0.014	13.70
Eggplant	0.010	0.0069	6.18
Endive	0.105	0.0273	7.58
Escarole	0.087	0.0116	6.10
Gooseberries, green	0.023	0.088	13.05
Grapes, Concord	0.024	0.025	15.30
Grapes, Thompson's seedless	0.013	None	23.90
Grapefruit	0.015	None	11.50

* Kohman, E. F.: Jour. Nutr., **18**, 233, 1939.

Food items.	Calcium, per cent.	Oxalic acid, per cent.	Total solids, per cent.
Kale	0.31	0.013	11.05
Kale, minus leaf ribs	0.294	0.011	18.05
Lambsquarters	0.099	1.11	8.20
Lemon juice	0.011	None	9.20
Peel	0.17	0.083	18.90
Lettuce	0.073	0.0071	6.46
Lime juice	0.015	None	10.39
Peel	0.26	0.11	31.00
Mangoes	0.015	None	15.35
Melons, Casaba	0.0054	None	11.22
Honeydew	0.0090	None	6.08
Mustard greens	0.235	0.0077	8.40
Nectarines	0.0084	None	14.45
Okra	0.077	0.048	13.20
Onions, green	0.057	0.023	13.65
Oranges	0.038	0.024	15.15
Orange peel	0.15	0.078	22.90
Parsley	0.29	0.19	13.70
Parsnips	0.049	0.010	22.70
Peaches, Alberta	0.012	0.0050	15.68
Hiley	0.0089	None	14.10
Pears, Bartlett	0.014	0.0030	17.60
Peas	0.019	None	19.50
Peppers, sweet, green	0.0135	0.016	7.34
Pineapple, Hawaiian, canned	0.019	0.0063	17.44
Plums, damson	0.015	0.010	11.70
Greengage	0.0080	None	13.20
Poke	0.052	0.476	7.74
Potatoes, Irish	0.0094	0.0057	20.38
Sweet	0.034	0.056	33.60
Prunes, Italian	0.12	0.0058	15.76
Purslane, leaves	0.13	0.910	9.45
Stalks	0.067	0.518	8.44
Radishes	0.028	None	3.75
Rape	0.11	0.0015	10.82
Raspberries, black	0.058	0.053	22.10
Red	0.023	0.015	14.10
Rhubarb	0.044	0.50	6.62
Spinach	0.122	0.892	10.35
Spinach, canned	0.058	0.364	7.15
Spinach, New Zealand, leaves	0.11	0.89	7.60
Spinach, New Zealand, stalks	0.083	0.65	8.26
Squash, green, summer	0.036	None	5.51
Strawberries	0.031	0.019	10.48
Tomatoes	0.010	0.0075	5.76
Turnips, peeled	0.037	None	8.16
Unpeeled	0.028	0.0018	6.58
Turnip greens	0.245	0.0146	8.25
Watermelon	0.0060	None	10.42

Phosphorus.—Certain phosphorus compounds are less available than others. A variable amount (20 to 60 per cent) of ingested phytins (calcium-magnesium salts of inositolhexaphosphoric acid) are excreted unchanged. The fate of the remainder is obscure. On the average, 97.5 per cent of the phosphorus of animal origin is utilizable. Where cereals bulk large in the dietary, the total phosphorus content is a wholly incorrect guide as to the available phosphorus intake. According to the authorities responsible for the appended data, Table 39, phytin constitutes less than 5 per cent of the total phosphorus of an average middle-class English diet.

TABLE 39.—**Phytin Content* of Various Foods.†**

Food items.	Total P, mg. per 100 grams.	Phytin P, mg. per 100 grams.	Phytin P as percentage of Total P.
Cereals			
Barley, pearled	354	78	22.0
Barley, whole (incl. husk)	335	211	63.0
Bread, brown	198	82	41.5
Hovis	211	90	42.5
Swedish hard	360	90	25.0
Turog	127	35	27.6
White	59	3	5.1
Wholemeal	237	87	36.5
Corn, see Maize.			
Digestive biscuits	134	40	30.0
Flour, white	102	15	14.7
Flour, wholemeal	355	166	46.8
Grapenuts	255	86	33.7
Maize, yellow	363	210	58.0
Millet, whole	350	191	55.5
Oatmeal, Scotch	380	160	42.0
Oats, whole (incl. husk)	350	182	52.0
Post Toasties	50	8	16.0
Rice, polished	99	41	41.5
Rice, unpolished	350	240	68.5
Rolled oats	339	224	66.0
Rusks	81	9	11.0
Ryvita	336	100	29.7
Sago	38	19	50.0
Shredded Wheat	173	79	45.3
Tapioca	42	0	0
Vitawheat	340	140	41.2
Wheat, whole	361	168	46.4
Cocoa and Chocolate			
Cocoa	675	162	24.0
Chocolate, milk	215	38	17.6
Chocolate, plain	139	82	58.5
Fruit			
Apples	8.5	0	0
Bananas	28.1	0	0
Blackberries	25.9	4.2	16.2
Figs, dried*	91.5	11.9	13.0
Prunes*	83.0	0	0
Legumes			
Beans, baked, canned	184	27	14.6
Beans, broad, boiled	108	5.4	5.0
Beans, butter, raw*	318	147	46.3
Haricot, raw*	309	154	50.0
Lentils	243	93	38.3
Peas, blue	303	150	49.5
Peas, canned	168	29	17.0
Peas, fresh	105	11	10.8
Peas, split	268	124	46.3
Nuts (1936 values)			
Almonds (shelled)	442	364	80.1
Barcelona nuts (shelled)	299	250	83.6
Brazil (shelled)	592	510	86.1
Chestnuts (shelled)	74	9	12.2
Cocoanut (shelled)	94	75	80.0
Filberts (hazelnuts)	229	170	74.2
Peanuts	365	220	60.2
Walnuts	510	212	41.5

* Results expressed on fresh weight basis of edible portion only: "dried" foods reported on [illegible] weight basis.

† McCance, R. A., and Widdowson, E. M.: Biochem. J., **29**, 2697, 1935

Food items.	*Total P, mg. per 100 grams.*	*Phytin P, mg. per 100 grams.*	*Phytin P as percentage of Total P.*
Vegetables			
Carrots	20.0	3.3	15.8
Cauliflower	35.7	0	0
Celery	31.7	0	0
Jerusalem artichokes	37.0	9.2	25.0
Mushrooms	136.5	0	0
Onions	30.0	0	0
Potatoes, new, boiled	35.7	8.2	23.0
Potatoes, old, boiled	31.0	6.0	19.3
Spinach	98.0	0	0
Swedes	19.0	0	0
Turnips	27.5	0	0

Iron.—The ingested iron is no criterion as to that assimilated. The nearer the iron comes to duplicating the type of organic linkage found in hemoglobin, the less available it is for human use. Neither heme nor chlorophyll enter hemoglobin synthesis although the globin fraction is available for new hemoglobin formation. Iron is unique in that the body regulates its absorption rather than depending upon excretion of excess. Gastric juice must first reduce iron compounds to the ferrous state prior to duodenal absorption.

TABLE 40.—**Available or Ionizable Iron.**†

Food items.	Total iron, mg. per cent.	Ionizable iron, mg. per cent.
Almonds	4.23	4.19
Apples, eating	0.29	0.26
Cooking	0.29	0.29
Apricots, fresh	0.37	0.35
Dried	4.09	4.01
Artichokes, globe, boiled	0.49	0.49
Avocados	0.53	0.53
Bacon, raw	1.00	0.29
Bananas	0.41	0.41
Beans, baked, canned	2.05	2.01
Butter, boiled	1.67	1.19
Haricot, boiled	2.50	2.10
Runner, boiled	0.59	0.44
Beef, raw	3.70	0.37
Roast, lean	5.00	0.95
Beer	0.05	0.05
Beets, boiled	0.70	0.66
Blackberries	0.85	0.34
Brazil nuts	2.82	1.75
Bread, white	1.00	0.89
Whole wheat	2.70	2.13
Brussels sprouts, boiled	0.63	0.47
Cabbage, boiled	0.47	0.38
Raw, 72% available.		
Carrageen moss, dried	8.88	8.61
Carrots, boiled	0.37	0.36
Raw	0.56	0.56
Cauliflower, boiled	0.48	0.48
Celeriac, boiled	0.84	0.82
Celery	0.61	0.61
Cherries	0.38	0.38

† These data are calculated from McCance and Widdowson (1940) and do not necessarily agree with the values shown in Table 41 or elsewhere in this book.

TABLE 40.—**Available or Ionizable Iron.**—*Continued*

Food items.	Total iron, mg. per cent.	Ionizable iron, mg. per cent.
Chestnuts, baked, 51% available.		
Chicken, roast	2.60	0.73
Chicory	0.69	0.44
Chocolate, dark	3.28	2.91
Milk	1.67	1.40
Cocoa powder	14.30	13.30
Cocoanut	2.08	1.79
Milk	0.10	0.07
Cod, steamed	0.50	0.50
Cranberries	1.11	0.78
Cucumber	0.30	0.30
Currants, black	1.27	1.27
Red	1.22	1.04
Dried	1.82	1.62
Custard apple	0.53	0.53
Damson plums	0.41	0.29
Dates	1.61	1.32
Eggplant, raw	0.39	0.20
Eggs	2.53	2.53
Endive	2.77	1.99
Figs, fresh	0.42	0.40
Dried	4.17	4.00
Flour, white	0.92	0.86
Gooseberries	0.32	0.13
Grapefruit	0.26	0.24
Grapes, black	0.34	0.28
White	0.34	0.29
Greengage plums	0.37	0.31
Haddock, steamed	0.70	0.70
Ham, cooked, lean	2.60	0.39
Hazelnuts	1.06	1.04
Heart, baked	8.10	5.10
Herring	1.50	1.50
Fried	1.90	1.41
Herring roe, fried	1.50	1.48
Horseradish	2.03	2.03
Kidney, pig, fried, 58% available.		
Ox, stewed	7.10	4.69
Leeks, boiled	2.00	1.82
Lemon juice	0.14	0.11
Lentils, raw	7.62	5.03
Lettuce	0.73	0.46
Liver, calves', raw	13.90	13.90
Pig's, raw, 80% available.		
Lamb's, fried, 100% available.		
Ox, fried	20.70	18.42
Loganberries	1.37	1.04
Mackerel, fried	1.20	0.77
Mushrooms	1.03	1.02
Mustard and cress	4.54	1.91
Mutton, roast	4.30	1.03
Nectarines	0.46	0.40
Oatmeal	4.12	3.96
Olives, bottled, brined	1.03	1.00
Onions	0.30	0.30
Orange juice	0.30	0.25
Parsnips boiled	0.45	0.45
Passion fruit	1.12	1.12
Peaches, fresh	0.38	0.38
Dried	6.75	6.21
Peanuts	2.04	2.04
Pears, eating	0.22	0.22
Cooking	0.16	0.15

Food items.	Total iron, mg. per cent.	Ionizable iron, mg. per cent
Peas, fresh, raw	1.88	1.39
canned	1.87	1.87
dried, boiled	1.44	1.22
split, boiled	1.74	1.24
Pineapple	0.42	0.38
Plaice, steamed	0.60	0.58
Plums	0.30	0.16
Pomegranate juice	0.15	0.04
Pork chops, fried	2.40	1.13
Potatoes, boiled	0.48	0.47
Prawns, boiled, 81% available.		
Prunes, dried	2.90	2.09
Quinces	0.32	0.17
Rabbit, stewed	1.90	0.80
Radishes	1.88	1.17
Raisins, dried	1.55	1.49
Raspberries	1.21	0.92
Ryvita	3.73	3.73
Rhubarb	0.40	0.40
Rice	0.45	0.38
Salmon, canned	1.30	1.20
Salsify, boiled	1.23	1.21
Sardines, canned	4.00	2.60
Sausage, beef, fried	4.10	2.95
Pork, fried	3.30	2.70
Sea-kale, boiled	0.60	0.55
Skate, fried	1.20	1.20
Sole, steamed	0.70	0.70
Spinach, boiled	4.00	2.30
Strawberries	0.71	0.37
Sultanas, dried	1.82	1.18
Swedes, raw	0.35	0.34
Sweetbreads, steamed	1.60	1.14
Syrup, English golden	1.45	1.38
Tangerine juice	0.27	0.26
Tomatoes	0.43	0.28
Tongue, cooked	3.40	0.65
Treacle, black	9.17	9.17
Turnips, raw	0.37	0.25
Veal, raw	2.30	0.92
Roast	2.50	1.37
Vegetable marrow, boiled	0.22	0.19
Walnuts	2.35	0.96
Watercress	1.62	1.07
Winkles, boiled	15.00	8.70

MINERAL DATA ON VARIOUS FOODS.

Introduction.—In compiling data on the mineral content of foods, recourse was had to the literature (elsewhere designated) and to unpublished analyses. Where available, averaged findings of different investigators in various sections of the country were taken as being more nearly representative than any single estimation. Where the reported analyses differed appreciably, an average was particularly desirable. On the other hand, any figure that diverged markedly from the results of other analysts was discarded. For example, the iron content of Malaga grapes is given by Toscani and Reznikoff as 0.54 to 0.71, by Peterson and Elvehjem as 2.28, by Sherman as 0.73, and by Rose as 0.30 mg. per 100 grams of fresh fruit. Our approximation is 0.68 mg.

Much of the literature gives mineral data to the third decimal place in milligrams. It was felt that it was unnecessary to report these analyses closer than to the nearest second decimal. This has reduced many of the manganese figures, especially as far as meat and fish are concerned, to identity where in reality slight divergence was encountered.

For the most part similar or identical laboratory procedures were employed in ascertaining any one element. This eliminates to a large extent variations in results attributable to method rather than to fact. It should not be forgotten, however, that method is an important factor affecting the results obtained and that no uniformity is claimed for any part of the data compiled in this table.

From the laboratory standpoint, it is preferable to remove moisture and to make all analyses on the desiccated basis. From the standpoint of the user of foods, reports on the dry basis are confusing and difficult to evaluate. To the best of our knowledge the figures reported in this table are on the wet basis, that is, on the food as it occurs naturally. Since moisture content may vary widely in samples of food otherwise identical, and since the percentage value will shift accordingly, the clinician should take the figures given as approximations. In determining the need of the patient, the quantity of the food eaten must be considered as well as its probable mineral composition. Parsley is outstanding for its high iron concentration, yet in terms of actual consumption, it usually is negligible as a source of iron. On the other hand, whole wheat bread, although not an iron-rich food, may be consumed in sufficient amounts to provide a significant portion of the daily requirement of the normal adult (Myers, *et al.*, 1935).

No factor affects the mineral composition of food more adversely or more strikingly than does cooking. Since our diet is composed to a large extent of cooked foods, analysis of such would seem the only logical procedure. Methods of cooking, however, differ so vastly as to discourage the analyst from attempting this extra process. In many cases no data are available as to the state of the food analyzed. Except where specified, analyses are best taken as involving the raw food. Many figures reported in the literature as on cooked food have been omitted because it had been stated or was apparent that the data had been obtained by "calculation." It is possible that some of the figures we have included for meat have been arrived at by general considerations plus a little mathematics; it has not always been possible to ascertain from the literature just how much actual analytical work has been done.

Many factors influence the mineral constituents of plant and animal foods during the period of their elaboration by Nature. It is not known to what extent these minerals are accidental rather than essential. As far as we know, the chief agents determining their presence are composition of soil and availability of moisture.

The nutritionist is specifically warned against using these analyses

alone for computation of mineral intake in investigating the calcium and phosphorus balance of patients. In such cases both food and excreta must be analyzed or interpretation of findings is futile. This table should be used only as an aid in selecting diets high or low with respect to certain minerals. As shown by Davidson and LeClerc (1936) appreciable variation is encountered in the mineral content of some vegetables grown under different conditions. Each apparently has a range of variation such that single values may be misleading. The inadequacy of analytical data is obvious.

As a rule, analyses have been made upon foods grown naturally. The modern market contains much which is hot-house grown or otherwise forced. Not only may the total quantity of minerals vary as maturation proceeds but its character may be altered. Immature corn, for instance, contains ten times as much inorganic phosphorus as the ripe cereal, the change to the organic form involving the production of the none-too-available phytic acid.

Exposure to metallic containers not infrequently augments the natural content of minerals, particularly with respect to copper and iron. The iron content of Norwegian goat cheese (11 to 27 mg. Fe per 100 grams) is ascribed to long cooking in iron pans, the element apparently being bound as a complex salt to lactic and citric acids in sour milk. Milk transported in cans contains more iron than milk taken directly from the cow. Canned corn has frequently been reported as having an unusually high copper content.

Calcium and Phosphorus.—The importance of these elements in the diet is indicated by the current efforts to increase their intake (and likewise that of iron) by fortifying staple foods. In general, Table 41 contains data on the natural concentrations. Where high values are listed, it may be inferred that fortification thereof is the rule.

Copper.—Minute amounts of copper have a stimulating effect on growth, respiration and hematopoiesis (Steenbock, Elvehjem, *et al.*, 1929). This element markedly accelerates the spontaneous oxidation of iron *in vitro*. The oxidation of glutathione is catalyzed by copper, not by iron (Voegtlin, *et al.*, 1931).

The respiratory pigment, hemoglobin, is replaced in the blood of cephalopods (*e. g.*, octopus and squid), crustacea (*e. g.*, lobsters and crabs), and mollusks (*e. g.*, oysters and clams) by hemocyanin which contains copper instead of iron, the copper concentration varying from 0.33 to 0.38 per cent.

Although the daily intake of copper is only 2 to 2.5 mg., it is a dietary essential. The copper of egg-yolk is not available to the body because of the easily-split sulfur compounds present; copper sulfide is not absorbed (Sherman, Elvehjem, Hart, 1934). Bread is a fair source of copper although poor in iron.

Manganese.—Extremely small amounts of manganese occur in the diet. Its function is obscure, although it appears to be necessary for avoidance of sterility in the male and for production of an

adequate supply of milk in the female rat. Manganese may also play an important rôle as a catalytic agent in blood regeneration. Like magnesium, it can act as a cofactor in an enzyme system involving thiamine and concerned with removal of the carboxyl group. Presumably manganese is essential in minute amounts as a growth factor.

Chlorides.—It is customary to report chloride analyses in terms of NaCl. Since the chlorine may be combined with sodium, potassium, calcium, magnesium, and other elements occurring in traces, this may lead to absurdities. For example, molasses is very high in potassium (1.5 per cent) and low in sodium (0.08 per cent); yet its chlorine content (0.317 per cent) includes it among foods high in "NaCl." As a rule, when a diet low in sodium chloride is indicated, it is the sodium, not the chlorine which is proscribed. Minimum daily requirement for salt is about 2 grams although vegetarians need twice as much; potassium-rich plant foods lack palatability without table salt. The average consumption of NaCl is 10 grams daily. Profuse sweating during acclimation to high temperatures leads to excessive loss of chlorides. As a prophylactic for "heat cramps" 0.1 per cent solution of NaCl in water at approximately 46° F. is satisfactory.

Sodium and Potassium.—Dietary restriction of table salt is commonly practiced but more and more attention is being directed toward sodium *per se*. Recent analyses by Bills *et al.*, (p. 376) make prescription of the low-sodium diet more feasible than previously. Since a major dietary source of sodium may be drinking water, analyses of public supplies are also offered (p. 375). All softened water should be suspected of an increased sodium content. Natural foods of animal origin contain much sodium, those of plant origin little sodium but considerable potassium. Processing often increases the amount of sodium present in the food. Cooking in high-sodium tap water will raise the level of a low-sodium food. Potassium is readily dissolved out from plant cells by hot water and lengthy cooking in much water may remove half of this mineral. Generally one is aware of added salt but a saline rinse prior to freezing may be overlooked. Furthermore, numerous sodium compounds are introduced in processing for one purpose or another, as sodium alginate employed as a stabilizer for ice cream and "chocolate milk."

TABLE 41.—Mineral Constituents of Various Foods.

(Estimated in milligrams per 100 grams of moist weight.)

A

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Agar-agar	400	126	4.90				
Ale, mild, draught	12	15	0.05	0.13		36	59
Ale, mild, bottled	13	18	0.08	0.07		36	59
Ale, pale, draught	11	22	0.05	0.08		35	58
Ale, pale, bottled	14	18	0.07	0.06		32	53
Ale, strong	17	29	0.10	0.11		54	89
Algaæ, Hawaiian:							
Limu eleele	170	34					
Limu lipoa	584	16					
All-Bran, Kellogg	77	1,336	16.67	1.00			
Almonds	230	457†	4.07	1.21	1.94	37	61
American cheese	930	701	1.30	0.05	0.11	880	1,452
Apple butter	11		10.00	0.07	0.08	25	42
Apple butter, Heinz	18	12	2.20	0.64			
Apple nuggets (dried)	24	42	4.10				
Apples, canned			0.58				
Apples, dried	32	48	1.50			61	100
Apples, fresh	8	12	0.38	0.10	0.04	5	8
Apple sauce	6	1	0.34				
Apricots, canned	10	20	0.65	0.34	0.08		
Apricots, dried	65	120	6.74	0.37	0.28	9	15
Apricots, dried, cooked	18	32	2.01	0.11			
Apricots, fresh	13	24	0.30	0.14		2	3
Arrowhead, fresh corm	16	207	4.90				
Arrowroot	7	27	1.95	0.22		7	11
Artichokes, French	40	94	1.89	0.31	0.36		
Artichokes, French, boiled	44	40	0.49	0.09		84	139
Artichokes, Jerusalem, boiled	30	33	0.41	0.12		58	96
Asparagus, fresh	25	39	0.79	0.14	0.10	39	64
Asparagus, boiled	26	85	0.89	0.20		31	51
Asparagus, canned	21	32	0.75				
Asparagus tips, canned	2	38	1.44	0.15	0.13		
Avocado (alligator pear)	45	44	6.30				
Avocado, Calavo strain	37	49	1.50				
Avocado, West Indian	15	31	0.53	0.21		6	10

B

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Baby Ralston	600	600	24.00	0.30			
Bacon, canned	14	38	0.90				
Bacon, crisp, drained	12	216	3.00	0.52	0.02	4,500	7,410
Bacon, raw	10	96	1.50		0.01	38	63
Baked beans, Heinz:							
Boston Style	81	94	1.10	0.32			
Kidney	32	63	1.70	0.35			
Pork and tomato sauce	69	46	1.10	0.24			
Vegetarian	63	42	1.70	0.30			
Bamboo shoots	5	44	0.70				
Bananas	8	30	0.60	0.21	0.82	125	206
Barley, entire	51	400	4.75	0.37	1.59		
Barley, pearled	10	206	0.67	0.12		105	173
Barley, pearled, boiled	3	70	0.23	0.04		36	59
Bass			0.42	0.21	0 03		
Bass, steamed	47	220	0.70			85	140

* For ionizable iron, refer to page 237. † See page 236.

It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Bean soup, navy, dehydrated	148	463	10.30				
Beans:							
Baked, canned	62	184	2.05	0.24		810	1,328
Broad, cooked	21	99	0.98	0.43		14	23
Butter, cooked	19	87	1.67	0.16		2	3
French, boiled	39	15	0.59	0.10		11	18
Haricot, cooked	65	122	2.50	0.14		1	2
Kidney, dried	132	475	7.00	0.65	1.64	41	68
Kidney, canned	39	142	1.50				
Lima, fresh	28	133	2.20			9	15
Lima, canned	16	76	2.16				
Lima, dried	71	347	7.00	0.86	1.07	26	43
Navy, cooked	50	200	2.05				
Navy, dried	158	483	8.25	0.69	2.54	32	53
Scarlet runner, cooked	26	11	0.59	0.03		9	15
Soy, green, cooked	97	273	2.10				
String or snap	50	51	0.95	0.10	0.24	24	40
Beef:							
Bone-marrow			0.90				
Brain	8	380	2.30				
Corned	16	291	4.10			2,080	3,426
Dried	17	323	6.20				
Dripping	1	13	0.20			2	3
Heart	9	172	4.80				
Juice	8	31	44.40				
Kidney	7	252	5.50	0.11			
Liver	12	220	8.30	2.15	0.25		
Loin, med. fat	10	182	3.70	0.12			
Muscle, not trimmed	12	222					
Muscle, well trimmed	14	220					
Pancreas			6.00				
Round, lean	13	204	4.10	0.08	0.02	76	125
Tongue	8	199					
Beef, cooked:							
Bottom round, braised	5	234	4.40				
Clod, braised	7	169	4.00				
Clod, roasted	6	211	2.60				
Rib, roasted	8	199	2.10				
Sirloin, roast, lean	7	284	5.30	0.19		74	122
Sirloin, lean and fat	6	237	4.60	0.17		64	105
Steak, med. fat, fried	5	257	6.00			70	116
Steak, med. fat, grilled	9	303	5.20			64	105
Top clod, roasted	17	147	2.90				
Top round, roasted	12	213	3.80				
Topside, lean, boiled	4	247	8.30			49	81
Topside, lean, roast	6	286	4.70			62	102
Beef, roasted, canned	18	157				839	1,382
Beef sausage, fried	21	168	4.10	0.17		1,770	3,016
Beef stew	13	160	2.49			1,070	1,763
Beet greens	94	40	3.55	0.09	1.26		
Beet greens, cooked			2.98		0.90		
Beets, root	24	37	2.36	0.19	0.94	58	96
Beets, boiled	30	36	0.70	0.14		76	125
Beets, strained, Gerber	11	13	1.20				
Beets, strained, Heinz	17	37	1.60	0.19			
Bemax	60	1,166	10.60	1.59			
Blackberries, fresh	17	34	1.00	0.16	0.59	10	17
Blanc-mange	117	95	0.17	0.04		93	153
Blueberries	25	20	0.41	0.11	4.44	8	13
Bluefish	23	255	1.10				

* For ionizable iron, refer to page 237.

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(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Bovril	52	1,300	12.10	0.83		6,880	11,330
Bologna	3	60	2.80				
Brains, calf, boiled	16	355	2.00			167	276
Brains, sheep, boiled	11	339	2.20			177	292
Bran Flakes	123	916	9.67	0.77			
Bran, wheat	120	1,215	12.70	1.17	9.11	90	149
Brazil nuts	176	592†	3.93	1.39	0.92	61	100
Bread, Boston brown	129	185	3.00			607	1,002
Bread, corn	55	102	0.70				
Bread, Graham	50	218	2.50	0.32	3.16	607	1,002
Bread, rye	24	148	2.30	0.28	1.28	1,025	1,691
Bread, rye, light	22	96	0.80				
Bread, white	31	97	1.00	0.34	0.31	353	582
Bread, white (1940)	80		1.10				
Bread, white, enriched	56	100	1.80				
Bread, white, salt-free	16					116	191
Bread, whole wheat	50	250	3.30			381	628
Bread, whole wheat, salt-free	11					31	51
Breadfruit	84	68	0.26			100	165
Broccoli	122	59	3.30	1.37			
Broccoli tops, cooked	160	54	1.52	0.10		51	84
Brussels sprouts	27	121	2.23	0.10	0.27	40	66
Brussels sprouts, cooked	27	45	0.63	0.08		11	18
Buckwheat flour	10	176	1.20	0.07	2.09	12	20
Burdock, fresh root	64	39	3.90				
Butter	15	17	0.20	0.03	0.04	1,212	2,000
Butter, salt-free	15					162	267
Buttermilk	105	97	0.25			99	163
Butternuts			6.84	1.17			

C

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Cabbage, Chinese			0.58	0.06	0.12		
Cabbage greens	106	99				68	112
Cabbage, red, raw	53	32	0.57	0.09		45	74
Cabbage, Savoy, boiled	53	27	0.72	0.07		9	15
Cabbage, spring, boiled	30	32	0.45	0.07		6	10
Cabbage, white, fresh	45	26	0.50	0.05	0.07	24	40
Cabbage, winter, boiled	58	16	0.47	0.04		14	23
Cake, light batter type	62	126	2.0				
Calavo (Avocado)	37	49	1.50				
Calves' liver	11	205	5.40	4.41	0.34		
Cantaloupe	17	15	0.51	0.06	0.04	41	68
Capers	122	62					
Carrageen moss, dried	845	205	8.88	0.51		1,150	1,894
Carrots	46	38	0.60	0.08	0.06	36	59
Carrots, new, cooked	29	30	0.43	0.08		28	46
Carrots, old, cooked	37	17	0.37	0.08		31	51
Casec, dry	1,785	442					
Cashew nuts	48	480					
Catfish, fried	19	228	2.30			150	248
Catfish, steamed	14	212	0.60			108	178
Cauliflower	122	60	1.43	0.14	0.17	50	83
Cauliflower, cooked	23	33	0.48	0.06		12	20
Caviar	137	176				1,819	2,997
Celeriac, cooked	47	71	0.84	0.13		23	38
Celery	68	48	0.60	0.01	0.16	156	257
Celery, cooked	52	19	0.43	0.11		100	165
Celery cabbage			0.58	0.06	0.12		
Cemac	220	300	7.60	1.50		40	[illegible]

* For ionizable iron, refer to page 237.

† See page 236.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaC
Cereal, Mead's	780	620	30.00	1.30			
Chard	87	40	4.02	0.11	0.80	39	64
Cheese:							
American, Cheddar	930	701	1.30	0.05	0.11	880	1,452
Cottage	82	263	0.11				
Dutch	900	478	0.78	0.05		2,050	3,380
English cream	30	44	0.14	0.04		151	249
Full-cream, California	635	528				1,012	1,668
Gorgonzola	540	375	0.50	0.15		1,800	2,965
Gruyère	1,080	698	0.26	0.27		825	1,359
Parmesan	1,220	772	0.37	0.36		1,110	1,830
Pot	100	326					
Stilton	362	304	0.46	0.03		1,720	2,935
Swiss	1,086	812	1.20	0.13	0.16		
Cherries, glacé	44	18	2.90	1.28		71	117
Cherries, Royal Anne, canned	59	17	0.27	0.12	0.78		
Cherries, sweet	19	31	0.50	0.14	0.03	14	23
Cherry juice	17	18	0.30			3	5
Chestnuts	34	93†	4.10	0.06	3.67	6	10
Chicken, boiled	11	270	2.10			62	102
Chicken, boned, canned	32	218	1.9				
Chicken, dark meat	11	208	1.01	0.41			
Chicken, light meat	11	208	0.70	0.27			
Chicken, lean, no skin	15	270	3.80				
Chicken, roast	15	271	2.60			100	165
Chicory	18	21	0.69	0.14		25	42
Chili sauce	16	22	1.50	0.39	0.15		
Chili con carne, without beans, canned	21	152	0.7				
Chipped beef	20	370	5.1				
Chives	48	57	8.40				
Chocolate, bitter	92	455	3.00	2.67	3.05	51	84
Chocolate, sweetened	80	400	2.20	2.00			
Chocolate, milk	175	215	1.67	0.14		132	218
Chocolate, plain	26	139	3.28	1.11		9	15
Chow Chow, Heinz	32	53	2.50	0.18			
Chutney, apple	27	34	1.01	0.10		29	48
Chutney, tomato	26	37	0.93	0.12		46	76
Cider	8	9				6	10
Citron, fresh, unripe	64	20	0.70	0.08			
Citron, candied	41	17	0.32	0.14			
Citron, preserved, com.	86	22	1.24	0.48			
Clams, round, raw	106	116				1,220	1,940
Clams, soft, long	123	105				910	1,500
Cocoa, dry	120	720	3.00‡	3.34	3.53	51	84
Cocoanut, fresh	24	74†	2.67	0.70	1.31	120	198
Cocoanut, shredded	59	155		0.69		239	394
Cocoanut milk	29	37	0.10	0.04		183	300
Cocomalt	300	330	17.60				
Cod, fresh	10	187	0.34	0.47	0.01		
Cod, salt, raw	27	287	0.52				
Cod, fried	50	261	1.00	0.10		145	239
Cod, grilled	31	274	1.00			130	215
Cod, steamed	15	242	0.50	0.10		120	198
Cod roe, baked in vinegar	13	402	2.30			173	285
Cod roe, fried	17	504	1.60			188	310

* For ionizable iron, refer to page 237. † See page 236.

‡ T. and R. report cocoa, A.P., as having Fe 12.6 milligrams per 100 grams.

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(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Coffee infusion:							
2 minutes	2	2	Trace	Trace			
5 minutes	3	3	Trace	Trace			
10 minutes	4	4	Trace	Trace			
20 minutes	4	5	Trace	Trace			
Collards	202	74	1.68				
Conch meat	89	112	1.22				
Corn:							
Sweet, green	6	103	0.51	0.08	0.15	14	23
Sweet, dried	21	376	2.90		0.60		
Golden, canned	4		0.70	0.10	0.03		
Maize	29	281	3.64	0.48	0.75		
Maize, dry	150	334					
Corn bread	55	102	0.70				
Corn Flakes, Kellogg	8	56	2.67	0.17	0.05		
Corn flour	15	39	1.43	0.13		71	117
Corn syrup	2	31	0.20				
Corned beef	16	291	4.10				
Cornmeal, degerminated	10	140	1 0				
Cornmeal, whole-grain	18	262	2 7				
Cornmeal, cooked	5	39	0.20				
Cornmeal, yellow, raw	16	152	1.30	0.20	0.28	146	241
Crab	18	191			0.03		
Crab, boiled	29	350	1.30			570	939
Crabmeat (Atlantic), canned	133	38	2.00	1.30			
Crackers, Graham	20	203	1.88			530	873
Crackers, soda	20	100	1.50				
Cranberries	12	10	0.45	0.09	0.30	9	15
Crayfish	63	120		0.80	0.10	287	473
Cream	99	77	0.22	0.15		80	132
Cream of Wheat, cooked			0.83	0.28	0.44		
Cream of Wheat, "new 5-minute"	504	590	42.40				
Cucumber	16	26	0.35	0.06	0.15	30	50
Currant juice	16	13					
Currants, fresh	26	38	0.70			6	10
Currants, black	60	43	1.27	0.14		15	25
Currants, black, stewed	42	30	0.89	0.10		10	16
Currants, red	36	30	1.22	0.12		14	23
Currants, red, stewed	26	21	0.89	0.90		10	16
Currants, white	22	28	0.93	0.14		11	18
Currants, dried	82	195	4 74	1.12	0.31	60	99
Custard apple	12	51	0.53	0.15		40	66
Curried meat	33	101	4.70			436	718
Curry powder	637	270	75.00	1.04		470	775
Custard, egg, baked	127	130	0.51	0.05		123	203
Custard, egg, boiled	113	116	0.46	0.04		110	181
Custard powder	122	98	0.15	0.04		110	181
Cuttlefish	32	48	2.90	0.40	0.17	410	676

D

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Damsons	24	16	0.41	0.08		<1	
Damsons, stewed	16	11	0.28	0.06			
Dandelion greens	63	45	6.04	0.15	0.34	99	163
Dasheens, corms	13	32	1.50				
Date pudding, Heinz	64	78	0 50	0.19			
Dates	71	49	5.07	0.38	0.15	228	376

* For ionizable iron, refer to page 237

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	NaCl
Dextri-Maltose with Vitamin B, Mead's			8.40	2.00			
Doughnuts	21	55	1.62	0.11		89	147
Duck	10	240	1.71	0.41	0.03		
Duck, roast	19	231	5.80			158	[illegible]
Dumpling	6	31	0.32	0.03		626	1,030
E							
Eel			0.51	0.17	0.03		
Eel, stewed	42	137	1.20			30	50
Egg, whole	68	224	2.52	0.23	0.03	106	175
Egg-white	15	14	0.10	0.03		155	256
Egg-yolk	130	592	7.60	0.40	0.11	94	155
Eggs, fried	64	256	2.53	0.05		199	328
Eggs, poached	52	239	2.30	0.03		155	255
Eggs, raw or boiled	56	218	2.53	0.03		159	262
Eggs, scrambled	62	191	2.08	0.05		1,910	3,145
Eggs, omelette	39	143	1.63	0.04		1,520	2,495
Eggs, cheese omelette	316	356	2.20	0.06		2,180	3,590
Eggplant	11	23	0.61	0.10	0.11	24	40
Embo	42	1,084	7.00				
Endive	104	38	1.23	0.09	0.22	167	276
Escarole	27	29	1.53				
F							
Farina, raw	21	125	0.90	0.29	0.45	76	125
Fig pudding, Heinz	97	76	1.10	0.16			
Figs, dried	162	116	3.96	0.35	0.35	43	71
Figs, fresh	53	36	0.79	0.06		14	23
Filberts, hazel nuts	287	354†	4.50	1.35	4.17	67	111
Finnan haddie	19	195	0.90				
Fish paste	146	210	6.00	0.06		2,380	3,920
Fish, white, fried, av.		235	1.10			179	295
Fish, white, steamed, av.		232	0.65			111	183
Flounder, fried	75	218	1.10			200	330
Flounder, steamed	55	296	1.30			148	244
Flounder, "sole"	36	163	0.75	0.18	0.02		
Flours:							
Buckwheat	10	176	1.20	0.70	2.09	12	20
Graham	35	206	3.70	0.49	4.28	70	116
Rye	18	289	2.60	0.42	1.94	55	[illegible]
White	16	106	1.30	0.17	0.40	74	122
Whole wheat	31	238	5.00			70	[illegible]
Force	66	339	3.98	0.36		1,120	1,845
Frankfort sausage	11	216	2.50				
Fruit salad, canned	8	10	3.45	0.03		3	5
G							
Gelatin, Knox sparkling	453	234					
Ginger, ground	97	136	17.20	0.45			
Gingerbread	36	81	1.26	0.07		40	[illegible]
Goose	9	176	2.02	0.33	0.05	104	[illegible]
Goose, roast	10	267	4.60				
Gooseberries	35	31	0.47	0.08	0.04	159	[illegible]

* For ionizable iron, refer to page 237.

† See page 236

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Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Gooseberries, green	28	34	0.32	0.13		7	11
Gooseberries, ripe	19	19	0.58	0.15		11	18
Graham flour	35	306	3.70	0.49	4.28	70	116
Grape jelly			1.00				
Grape juice, Concord	11	11	0.30	0.02		2	3
Grape juice, Welch's	9	9				2	3
Grapes, American types	19	35	0.30	0.06	0.09	5	8
Grapes, black	4	16	0.34	0.08		<1	
Grapes, Isabella	12	23	0.33				
Grapes, Isabella, without skins	8	16	0.23				
Grapes, Italian	15	8	0.43			4	6
Grapes, white	19	22	0.34	0.10		<1	
Grapefruit	21	20	0.27	0.03	0.01	5	8
Grapefruit, canned			0.70				
Grapefruit juice, Florida	27	20	0.18				
Grapenuts	48	333	5.64	0.19		905	1,490
Gravy, meat stock	3	6	0.07				
Greengages	17	23	0.37	0.08		1	2
Grouse, roast	30	338	7.60			134	220
Guava, common, whole	10	22	1.46			45	74
Guava, common, without seeds	15	16	0.30				
Guava, common, juice	6	6	0.12				
Guava, strawberry, whole	34	20	0.28				
Guinea-fowl, roast	19	292	9.30			179	295
Gumbo	72	62	0.63	0.12	0.62		

H

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Haddock			0.48	0.23	0.02		
Haddock, fillets, raw	32	216	1.00			156	257
Haddock, fried	114	247	1.20			181	298
Haddock, steamed	41	178	0.50			59	97
Haddock, smoked, steamed	58	248	1.00			1,900	3,140
Hake, fried	26	259	0.90	0.17		134	221
Halibut	8	200	0.94	0.23	0.01		
Halibut, steamed	13	255	0.60	0.07		80	132
Ham, boiled	12	218	1.70			3,350	5,520
Ham, fresh, lean	14	229	2.10				
Ham, smoked, med. fat	11	211	1.40				
Ham and eggs, canned	43	166	2.20				
Hamburger	9	172	2.40				
Hare, roast	28	337	9.80	0.24		108	178
Hare, stewed	21	248	10.80			74	122
Hazel nuts, filberts	287	354	4.50	1.35	4.17	67	111
Heart, beef	9	172	4.80				
Heart, sheep, roast	10	389	8.10			125	207
Herring			0.57	0.28	0.02		
Herring, baked in vinegar	58	326	1.60			119	196
Herring, fillets, raw	101	272	1.50			122	200
Herring, fried	39	339	1.90			125	207
Herring roe, fried	16	915	1.50			123	203
Hickory nuts			2.38	1.43			
Hominy, cooked	2	20	0.10				
Hominy, raw	10	70	0.54	0.19	0.11	46	76
Honey	4	19	3.20	0.20	0.03	29	48

* For ionizable iron, refer to page 237

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Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Horseradish	100	80	2.00	0.14		16	26
Huckleberries	25	20	0.90		4.40	8	13
Hung-toi (N. Y. C.)	77	64	3.20				

I

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Ice-cream	150	120	0.17				
Irish stew	10	57	0.90			559	920

J

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Jam, fruit with edible seeds	24	18	1.47	0.23		9	15
Jam, stone fruit	12	18	1.02	0.12		3	5
Jelly	14	5	0.30			4	6

K

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Kale	197	72	2.54		0.50		
Ketchup, tomato, Heinz	17	42	1.20	1.30			
Kidney beans, canned	39	142	1.50				
Kidney beans, dried	132	475	7.00	0.65	1.64	41	68
Kidney, ox, raw	14	262	15.00			256	422
Kidney, ox, stewed	21	392	7.10			144	237
Kidney, sheep, raw	13	254	11.70	0.31		295	487
Kidney, sheep, fried	17	433	14.50	0.30		288	475
Kidney, veal	9	171	4.00				
Kippers, baked	65	426	1.40			1,520	2,500
Kix	130	110	5.00				
Kohlrabi	77	44	0.68	0.14	0.11	53	87
Kumquats			0.51	0.08	0.06		

L

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Lamb chops	11	202	1.60	0.42	0.04		
Lamb muscle	21	180					
Lamb, roast	11	212	1.70				
Lard	1	3	0.10	0.02		4	6
Leeks	58	56				24	40
Leeks, cooked	61	28	2.00	0.09		43	71
Lemon juice	24	10	0.15			3	5
Lemon peel, Florida			0.75				
Lemons	36	18	0.60	0.04	0.04	2	[illegible]
Lentils, cooked	32	131	2.60	0.27		13	21
Lentils, dry	102	383	8.60			50	82
Lettuce, head	43	42	0.56	0.04	†	74	122
Lettuce, leaf	27	42	1.76	0.06	†		
Lima beans, canned	16	76	2.16				
Lima beans, dried	71	347	7.00	0.86	1.07	26	43
Lima beans, fresh	28	133	2.20			9	15
Limes	55	36				39	64
Litchi	3	32	0.21				
Liver, beef, raw	12	220	8.30	2.15	0.25		
Liver, calves', raw	11	205	5.40	4.41	0.34		
Liver, calves', fried	9	576	21.70			120	198
Liver, ox, fried	9	550	20.70			82	135

* For ionizable iron, refer to page 237.

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Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Lobster	20	208	0.44	0.73	0.04		
Lobster, boiled	62	283	0.80			525	865
Loganberries	35	24	1.37	0.14		16	26
Lotus, fresh	25	86	2.70				
Lungs:							
Beef	15	173					
Horse	17	173	11.02				
Mutton	13	255	5.19			121	199
Pork	12	153	3.04			120	198
Veal	10	160	4.32			112	185
Lupins, dry	191	520				34	56

M

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Macaroni and cheese	199	162	0.35	0.04		1,060	1,746
Macaroni, cooked	4	25	0.25	0.26			
Macaroni in cream sauce, Heinz	93	45	0.10	0.09			
Macaroni, raw	22	144	1.20			73	120
Mackerel	11	273	0.81	0.30	0.02		
Mackerel, fried	28	280	1.20	0.20		114	188
Malted milk, Horlick's	272	402	1.30	1.22		516	849
Maltine, plain	59	196	1.10			70	116
Maltine, with cod-liver oil	41	137	0.80			70	116
Maltine, with spleen-marrow and iron	57	237	280.00			70	116
Mamey apple	9	28				140	231
Mandarin orange, Italian	15	8	0.86			2	3
Mangos	21	17	0.20			19	31
Mangold	26	38				82	135
Maple syrup	107	13	3.00			10	16
Margarine	4	12	0.30	0.04		495	816
Marmalade	35	12	0.58	0.12		7	11
Marmite (*Vegex*)	980	2,620	4.60	0.60	Trace	6,760	11,140
Marrow, vegetable, cooked	14	13	0.22	0.03		14	23
Mayonnaise	7	18	0.25				
Mayonnaise, Heinz	47	37	0.30	0.44			
Mead's Cereal	780	620	30.00	1.30			
Meat paste (chicken, ham, tongue)	27	132	3.70	0.09		1,500	2,470
Meat juice, Valentine	64	255	9.00			1,123	1,850
Meat peptone	25	1,130				561	929
Mellin's Food	15	227	15.00				
Milk, cow's:							
Condensed	300	235	0.60			280	462
Dried	920	710	0.15	0.15			
Evaporated	276	182	0.53	0.07			
Powdered, skim	1,180	880	Trace				
Powdered, whole, Klim	820	620	Trace				
Reconstituted	136	110	0.24				
Skim	122	96	0.25			110	182
Whole	120	93	0.24	0.02	Trace	106	175
Milks:							
Buffalo	203	125				62	102
Camel	143	98				105	173
Carabao	128	92	0.22				
Goat	128	103				210	345
Human	20	20	0.15			35	58
Mare's	83	54				29	48
Sheep (ewe's)	207	123				71	117

* For ionizable iron, refer to page 237.

† Mn on northern grown lettuce, 1.08; on southern grown, 0.50.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Millet	14	327				19	31
Mince meat	85	175	3.00	0.08			
Mince meat, Heinz	37	35	1.80	0.44			
Molasses	258	30	7.97	1.93	0.04	317	523
Mulberries, black	36	48	1.57	0.06		4	6
Mullet, grey, steamed	14	256	2.00			77	127
Mullet, red, steamed	29	282	0.90			101	166
Mushrooms	14	98	3.14	1.79	0.08	21	35
Mushrooms, canned	22	45	5.60				
Mushrooms, fried	4	166	1.25	0.78		103	170
Mushrooms, dried		371	16.10				
Muskellunge			0.62	0.25	0.02		
Muskmelon	17	15				41	68
Mussels, boiled	197	331	13.50			315	519
Mustard	333	177	10.90	0.20		62	102
Mustard, Heinz			1.80	0.28			
Mustard and cress	66	66	4.54	0.12		89	147
Mutton chop, lean, raw	13	195	1.70	0.16		84	139
Mutton chop, lean, fried	15	222	3.10	0.13		134	221
Mutton chop, lean, grilled	21	239	2.50	0.18		110	181
Mutton chop, med. fat, raw	13	173	1.00	0.16		70	116
Mutton chop, med. fat, fried	14	184	2.60	0.12		92	152
Mutton chop, med. fat, grilled	18	206	2.40	0.18		90	149
Mutton, leg, boiled	4	238	5.10	0.24		67	111
Mutton, leg, roast	4	242	4.30			62	102
Mutton, scrag and neck, stewed	50	220	6.80			82	135

N

Nectarines	4	24	0.46	0.06		5	8

O

Oatmeal, cooked	11	65	0.59				
Oatmeal, raw	63	422	3.80	0.50	2.79	69	114
Okra	72	62	0.63	0.12	0.62		
Olive oil	Trace	Trace	0.08	0.07		Trace	Trace
Olives, green, brined	100	15	0.82	0.46	0.05	3,750	6,150
Olives, ripe, Heinz	105	14	0.40	0.34			
Olives, stuffed, brined	70	8	0.55	0.57	0.02	3,750	6,150
Onions	34	45	0.45	0.08	0.05	21	35
Onions, spring	135	24	1.24	0.13		36	59
Onions, boiled	24	16	0.25	0.07		5	8
Onions, fried	61	59	0.59	0.16		38	62
Onions, dehydrated	158	256	3.10				
Opihi, Australian limpet	280	170	1.34	0.23			
Orange juice	19	13	0.28	0.08	Trace	3	5
Oranges	26	20	0.51	0.13	0.03	6	10
Ovaltine	339	563	3.50	0.65		404	665
Oxo cubes	101	1,090	14.00	0.32		14,000	23,058
Oyster plant			1.24	0.27	0.35		
Oysters	52	155	3.14	3.07	0.21	590	974

* For ionizable iron, refer to page 237.

It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

P

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Pablum	780	620	30.00	1.30			
Pancakes	73	93	0.52	0.05		151	249
Papaya	19	13	0.25				
Parsley			19.21	0.21	0.94		
Parsnips	59	76	1.07	0.12	0.03	30	50
Parsnips, cooked	36	32	0.45	0.10		33	54
Partridge, roast	46	313	7.70			99	163
Passion fruit	16	54	1.12	0.12		37	61
Passion fruit, purple, juice	5	18	0.34				
Pastry, flaky, raw	10	49	0.52	0.04		287	473
Pastry, flaky, baked	12	60	0.63	0.05		351	578
Pastry, short, raw	11	60	0.60	0.05		325	536
Pastry, short, baked	14	74	0.74	0.06		399	657
Pea soup, dehydrated	73	397	6.00				
Peach preserve	14	15	0.26	0.29			
Peaches, canned	8	20	0.62	0.10	0.04		
Peaches, dried	60	120	6.06	0.27	0.67	11	18
Peaches, fresh	10	21	0.36	0.01	0.11	4	6
Peanut butter	72	396	1.80				
Peanut butter, Heinz	105	76		0.55			
Peanuts	71	399†	2.31	0.96	1.57	56	92
Pear juice	9	11					
Pears, canned	8	14	0.65				
Pears, fresh	14	17	0.46	0.10	0.06	11	18
Peas, dried	84	400	5.70	1.40	2.77	35	58
Peas, dried, cooked	24	113	1.44	0.17		9	15
Peas, fresh	28	127	1.77	0.24	0.41	24	40
Peas, green, cooked	13	83	1.22	0.15		8	13
Peas, green, canned	26	169	1.87	0.21		318	524
Peas, split, cooked	11	122	1.74	0.25		10	16
Pecans	89	335	2.58	1.36	3.48	50	83
Pep Bran Flakes, Kellogg	74	550	6.00	0.50			
Pepper (condiment)	127	130	10.20	1.13		60	99
Peppers, green	8	23	0.41	0.10	0.14	13	21
Perch, yellow			0.56	0.37	0.04		
Persimmon	22	22				2	3
Pheasant, roast	49	308	8.40			108	178
Pickerel			0.68	0.34	0.02		
Pickles, Heinz:							
Dill			0.80	0.22			
Fresh cucumber	24	24	0.60	0.18			
Onions, sour	20	5	1.00	0.12			
Onions, sweet	19	5	1.00	0.26			
Sour	17	19					
Sweet	9	8	1.20	0.21			
Sweet mustard	25	34	1.60	0.23			
Pickles, sweet, mixed	27	58	3.83	0.76	0.04		
Picnic "ham"	9	160	2.20				
Pigeon, boiled	18	352	9.80			75	124
Pigeon, roast	16	404	19.40			99	163
Pike			0.68	0.34	0.02		
Pineapple, canned	12	18	0.80	0.24			
Pineapple, fresh	8	17	0.32	0.07	1.07	51	84
Pistachio nuts			7.92	1.17	0.63		
Plaice, fried	45	251	0.80	0.15		174	287
Plaice, steamed	38	246	0.60			112	185
Plum pudding, Heinz	65	102					
Plums, canned	15	11	2.22	0.16	0.07		

* For ionizable iron, refer to page 237.

† See page 236

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Plums, fresh	20	32	0.77	0.15	0.07	2	3
Plums, Japanese, red, pickled	49		4.20			7,828	12,900
Poi, commercial†	22	51					
Pollack, fried	128	241	2.80			275	462
Pollack, steamed	13	202	0.50			114	188
Pomegranate	11	105	0.40			3	5
Pomegranate juice	3	8	0.15	0.07		53	87
Pork chops, lean	12	219	1.50	0.31	0.06		
Pork chops, loin, grilled, lean	9	211	2.90	0.09		113	186
Pork chops, loin, grilled, med. fat	8	178	2.40	0.09		72	119
Pork chops, med. fat	10	179	1.30				
Pork, leg, roast	5	363	1.70			83	137
Pork, loin, roast, lean	7	206	2.60	0.09		101	166
Pork, loin, roast, med. fat	7	185	2.30	0.09		77	127
Pork, loin, smoked, cooked, lean	27	219	2.30			3,100	5,100
Pork sausage	2	27	0.22				
Pork sausage, fried	20	141	3.30	0.15		1,390	2,290
Post Toasties	55	54	1.67	0.15		1,210	1,993
Potato soup	46	52	0.39	0.08		542	892
Potatoes, sweet, boiled	21	44	0.62	0.15		60	99
Potatoes, sweet, raw	19	45	0.92	0.15	0.15	94	155
Potatoes, white, raw	14	58	0.85	0.17	0.10	38	63
Potatoes, white, new, boiled	5	33	0.46	0.15		46	76
Potatoes, white, old, boiled	4	29	0.48	0.11		41	68
Potatoes, white, dehydrated	25	103	3.70				
Potatoes, French fried	14	72	1.35	0.27		140	231
Potatoes, mashed	12	32	0.45	0.10		71	117
Potatoes, roast	10	53	0.99	0.20		103	170
Prawns, cooked	145	349	1.10			2,550	4,200
Prune pudding, Heinz	69	54	1.10	0.16			
Prunes, California, 20 per cent water	62	98	4.50	0.31	0.43	27	45
Prunes, canned	51		1.53	0.15	0.13		
Prunes, dried	58	85	3.80	0.41	0.18	17	28
Prunes, dried, cooked	15	30	0.81				
Puffed Rice	10	100	1.07	0.56	0.73		
Puffed Wheat	40	420	4.10	0.70	2.72		
Pumpkin	23	46	1.10	0.03	0.04	36	59
Pumpkin, California, canned	31	14	1.04	0.20	0.29		
Pumpkin, custard	40		1.83	0.09	0.08		

Q

Quail	15	270	3.80				
Quinces	14	19	0.32	0.14	0.04	2	3

R

Rabbit, stewed	11	199	1.90	0.20		43	71
Radishes	31	31	1.36	0.16	0.05	54	89

For ionizable iron, refer to page 237. † 70 per cent water.

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(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Raisins, seeded	64	132	6.99	0.27	0.32	82	135
Raisins, seedless			4.13	0.20	0.34		
Ralston Wheat Cereal	50	400	4.00	0.60	4.00		
Ralston Wheat Oats	70	430	2.10				
Raspberries, red, fresh	49	52	0.99	0.13	0.51	22	36
Raspberry juice	21	12					
Rhubarb, fresh	44	18	0.86	0.05	0.15	36	59
Rhubarb, stewed	72	15	0.28	0.09		61	100
Rice, brown, raw	84	290	2.00	0.36	1.70		
Rice, polished, cooked	2	24	0.20				
Rice, polished, raw	11	99	0.98	0.19	1.08	54	89
Rice pudding	138	120	0.14	0.05		133	219
Rice, fermented, Japanese	9	70	0.50				
Rice Flakes, Heinz	12	181	0.40				
Rice Krispies, Kellogg	11	100	2.67	0.23			
Rice, Puffed	10	100	1.07	0.56	0.73		
Roe, cod, baked in vinegar	13	402	2.30			173	285
Roe, cod, fried	17	504	1.60			188	310
Roe, herring, fried	16	915	1.50			123	203
Roe, shad	23	241	1.20				
Rolls, plain, enriched	56	100	1.8				
Rolls, sweet, unenriched	56	100	0.5				
Romaine	45	53	0.42	0.04		73	120
Rusks	87	81	2.66	0.21		174	287
Rutabagas	74	56	1.07	0.15	0.13	58	96
Rye, entire	55	385	3.90			25	42
Rye flour	18	289	2.83	0.42	1.94	55	91
Ry-Krisp	70	400	4.00	0.33	3.50	1,212	2,000

S

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Salmon, canned	66	285	1.30	0.05		865	1,425
Salmon, fresh	10	245	0.83	0.19	0.01		
Salmon, fresh, steamed	29	302	0.80			64	105
Salmon, smoked	26	276	1.30				
Salsify, boiled	60	53	1.23	0.12		46	76
Salt, table	12	Trace	0.30	0.66		60,300	98,820
Salt pork, fat	2	42	0.60				
Sapato	26	6				87	143
Sardines	25	264	1.30				
Sardines, canned	409	683	4.00	0.04		1,200	1,980
Sardines, canned in oil, drained solids	35	365	1.80				
Sauerkraut	40	10	3.28	0.10			
Sauerkraut juice							2,500
Sausage, beef, fried	21	168	4.10	0.17		1,770	3,016
Sausage, black	31	27	19.50	0.26		1,320	2,175
Sausage, breakfast	22	86	1.90	0.08		1,300	2,140
Sausage, pork, fried	20	141	3.30	0.15		1,390	2,290
Savoy cabbage, boiled	53	27	0.72	0.07		9	15
Scallops, steamed	115	338	3.00			410	675
Scones (with egg)	47	118	0.97	0.07		127	209
Scones (without egg)	63	110	0.66	0.08		125	207
Seakale, cooked	48	34	0.60	0.07		12	20
Semolina	18	114	1.04	0.15		71	117
Shad			0.48	0.22	0.02		
Shad roe, raw	23	241	1.20				
Shepherd's pie	15	88	2.31			583	960
Shortbread	16	69	0.62	0.06		141	233

* For ionizable iron, refer to page 237.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Shredded Wheat	41	324	4.50	0.62	2.39	55	90
Shredded Wheat Biscuit							
Kellogg	43	384	6.88	0.96	2.39	55	90
Shrimp	96	171	2.67	0.43	0.03		
Shrimp, canned	75	210	2.00				
Shrimps, cooked	320	270	1.80	0.80		5,850	9,635
Smelts, fresh water			0.41	0.33	0.03		
Smelts, fried	686	535	3.30			138	228
Sole, fried	131	260	1.40			193	318
Sole, steamed	113	270	0.70			132	218
Soursop	9	30	0.38				
Soy bean curd	34	111	1.80				
Soy bean sauce						8,800	14,500
Soy bean milk	34	40					
Soy beans, fermented	88	236	3.70				
Soy beans, green, cooked	97	273	2.10				
Soy beans, whole, mature	227	586	8.00				
Soy flour, flakes, grits:							
Low fat	265	623	13.00				
Medium fat	244	610	13.00				
Full fat	195	553	12.10				
Spaghetti, cooked	4	25	0.21				
Spaghetti, raw	22	144	1.25				
Spaghetti in tomato sauce,							
Heinz	20	29	0.30	0.10			
Spanish melon	14	9	0.24	0.04		45	74
Spareribs	8	157	2.20				
Spinach, fresh	77	40	4.00	0.12	0.70	74	122
Spinach, cooked	595‡	93	4.00	0.26		55	90
Sponge cake	35	145	1.61	0.04		103	170
Sprats, fresh, fried	707	635	4.50			182	300
Sprats, smoked, grilled	436	565	5.70			1,330	2,200
Spring greens, cooked	86	31	1.33	0.08		16	26
Squab, with skin	12	217	3.00				
Squash, Hubbard	19	28	0.55	0.04	0.16		
Squash, summer, no							
seeds	18	16	0.35	0.08	0.14		
Steak and kidney pie	10	213	5.57			1,192	1,964
Stew meat, 73% lean beef	9	170	2.40				
Stew meat, 74% lean veal	11	197	2.70				
Stout	10	23	0.14	0.12		36	59
Strawberries, fresh	41	28	0.66	0.02	0.06	6	10
String beans	50	51	0.95	0.10	0.24	24	40
Sturgeon, steamed	15	263	2.00			138	228
Suet	6	7	0.40	0.04		18	30
Suet pudding, plain	45	60	0.41	0.04		156	257
Sugar, Demerara	53	20	0.89	0.06		35	58
Sugar, white	1	Trace	0.04	0.02		Trace	Trace
Sultanas, dried	52	95	1.82	0.35		15	25
Sunfish, common			0.54	0.14	0.03		
Surinam-cherry	15	20	0.33				
Swedes, boiled	42	18	0.29	0.04		9	15
Sweetbreads, stewed	14	596	1.60			74	122
Sweet potato, boiled	20	43	0.62	0.15		60	99
Sweet potato, raw	19	45	0.92	0.15		94	155
Swiss chard	87	40	4.02	0.11	0.80	39	63
Swiss cheese	1,086	812	1.20	0.13	0.16		
Swordfish	19	195	0.90				
Syrup, English golden	26	20	1.45	0.09		42	69

* For ionizable iron, refer to page 237. ‡ See page 233.

It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Consult label on food

(Estimated in milligrams per 100 grams of moist weight.)
(*Italicized letters* indicate trade names.)

T

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Tamarind	113	96	0.60			7	11
Tangerines	41	17	0.61	0.09	0.04	2	3
Tapioca pudding (baked with milk)	116	95	0.98	0.04		96	158
Tapioca, raw	16	6	1.60		0.69	18	30
Taro, steamed	26	61					
Tea, infusion	Trace	1	Trace	Trace		Trace	Trace
Toffee, home-made	11	10	0.55	0.04		40	66
Tomato, raw	11	26	0.44	0.06	0.14	34	56
Tomato, fried	15	25	0.50	0.12		59	97
Tomato, canned	7	26	1.20	0.09	0.04		
Tomato catsup	11	17	0.87	0.49	0.03		
Tomato juice	6	15	0.29	0.03	0.06	55	90
Tomato juice, canned			1.30				
Tomato juice, Heinz	5	17	0.80	0.05			
Tomato juice, Welch	8	15				57	94
Tomato and rice, creamed, Heinz	32	44	1.70	0.66			
Tongue, ox, pickled	31	229	3.00			3,000	4,940
Tongue, sheep, stewed	11	196	3.40			80	132
Treacle, black	495	31	9.17	0.43		815	1,340
Tripe, beef	9	42	3.78		0.02		
Tripe, stewed	127	132	1.60			30	50
Triscuits	33	296	4.00				
Trout	19	204	0.78	0.33†	0.03		
Trout, steamed	36	270	1.00			70	116
Trout, sea, steamed	12	290	1.00			261	430
Truffles	24	62				39	64
Tuna fish, canned, drained solids	34	290	1.70				
Tuna fish, canned, Total contents	30	252	1.50				
Tuna fish, canned in oil	26	276	1.30				
Tuna fish, fresh	19	195	0.90				
Turbot, steamed	14	188	0.50			142	234
Turkey, dark meat, cooked	23	423					
Turkey, dark meat, raw	12	231	2.04	0.20	0.05		
Turkey, light meat, cooked	20	373					
Turkey, light meat, raw	15	277	1.03	0.15	0.03		
Turnip greens	347	49	3.48	0.09	1.42	168	277
Turnip greens, cooked	98	45	3.08	0.09		15	25
Turnips	64	46	0.70	0.09	0.04	41	68
Turnips, boiled	55	19	0.35	0.04		31	51

V

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
V. B. W. Wafers	79	39					
Veal chop, med. fat	12	215	2.70	0.25	0.03		
Veal cutlet	13	228	3.00	0.25			
Veal muscle	15	223	2.50		0.03		
Veal, roast	15	287	3.60				
Vegetable marrow, cooked	14	13	0.22	0.03		14	23
Veger (Marmite)	980	2,620	4.60	0.60	Trace	6,760	11,140
Venison, roast	29	286	7.80			89	147
Vienna sausage, canned	19	164	0.60				
Vinegar	15	32	0.47	0.04		47	77
Vinegar, cider	16	13	0.30				

* For ionizable iron, refer to page 237.

† Lake trout.

(Estimated in milligrams per 100 grams of moist weight.)
(*Italicized letters* indicate trade names.)

W

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Walnuts, black			5.98		3.21		
Walnuts, English	89	358†	2.14	1.00	1.80	40	66
Watercress	157	52	7.21	0.04	0.54	61	100
Water chestnuts	2	65	1.80				
Watermelon	8	13	0.23	0.07	0.02	8	13
Welsh rarebit	409	302	0.69	0.06		832	1,370
Wheat bran	120	1,215	12.70	1.17	9.11	90	149
Wheat, breakfast, Heinz	27	291	1.20				
Wheat cereal, Ralston	40	400	4.00				
Wheat, Cream of, cooked			0.83	0.28	0.44		
Wheat, entire	53	374	5.00	0.72	3.44	68	112
Wheat flour:							
Patent, enriched	19	93	2.90				
Self-rising, enriched	220	330	2.90				
Whole wheat	38	385	3.80				
Wheat germ	71	1,050	10.00			70	116
Wheat, gluten	78	200				50	83
Wheat Krispies, Kellogg	50	292	5.00	0.63			
Wheat Krumbles, Kellogg	37	337	10.67	0.53			
Wheat Oata, Ralston	70	430	2.10				
Wheat, Puffed	40	420	4.10	0.70	2.72		
Wheat, refined, breakfast cereal	39	347	4.50	2.40			
Whey	44	35				119	196
Whey, dried	572	524					
Whitefish	150	263	0.42	0.19			
Whiting, fried	48	258	0.70			194	320
Whiting, steamed	42	189	1.00			93	153
Whole Wheat Flakes, Kellogg	43	374	6.33	0.53			
Whole wheat flour	31	238	2.50			70	116
Whortleberries, fresh	20	18					
Winkles, boiled in salt water	136	219	15.00			1,800	2,965
Winkles, boiled in fresh water	165	277	17.10			500	832

Y

Food items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Yam bean, fresh root	9	20	1.90				
Yams	8	41	7.40				
Yeast, Fleischmann	24	561	Trace			Trace	Trace
Yorkshire pudding	101	128	0.68	0.06		662	1,089

* For ionizable iron, refer to page 237.
† See page 236.

It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Consult label on food.

SULFUR IN FOODS.

Introduction.—In fruits and vegetables the sulfur content is low and exceedingly variable from sample to sample. In its determination considerable sulfur in the form of essential oils may be lost through volatilization. When dried fruits are treated with sulfur dioxide for preservation, unduly high values may be anticipated. The use of sulfate manures increases the sulfate content of the products grown thereon. The enormous sulfur content of carrageen moss is probably due to large quantities of inorganic sulfate.

Sulfur occurs in foods chiefly in organic combination, protein forms being the most important. The sulfur content of the following proteins is from Osborne, cited by Hutchison and Mottram† (1936), and is calculated on the dry basis:

	Per cent.		Per cent.
Albumin, serum	1.930	Legumin	0.385
Caseinogen	0.800	Ovalbumin	1.616
Edestin	0.880	Ovovitellin	1.028
Excelsin	1.086	Oxyhemoglobin	0.568
Gliadin	1.027	Zein	0.600

† Food and Dietetics, Hutchison, R., and Mottram, V. H., 9th edition, Baltimore, Wm. Wood & Co., 1941.

TABLE 42.—The Sulfur Content of Various Foods.*

(Estimated in milligrams of S per 100 grams of edible substances.)

Food items.	Mg. %.	Food items.	Mg. %.
All Bran, Kellogg's	182.0	Cheese, cheddar	230.0
Almonds	145.0	Dutch	186.5
Apples, cooking, raw	2.9	Gorgonzola	177.0
Eating	7.6	Gruyère	206.0
Apricots	6.1	Parmesan	251.0
Canned	1.0	Stilton	228.0
Dried	164.0	St. Ivel	186.0
Arrowroot	1.6	Cherries, cooking, raw	6.8
Artichokes, globe, boiled	15.5	Eating	7.9
Jerusalem, boiled	21.6	Glacé	21.0
Asparagus, boiled	46.6	Chestnuts	29.4
Avocados	19.4	Chicken, roast	232.0
Bananas	13.0	Chicory, raw	12.7
Barley, pearl	117.0	Chocolate, milk	67.0
Beans, baked	50.7	Plain	32.0
Broad, boiled	27.0	Cocoa	160.0
Butter, raw	109.5	Cocoanut	44.0
Boiled	47.2	Milk	23.8
French, boiled	8.3	Cod	171.0
Haricot, raw	166.5	Baked	256.0
Boiled	46.3	Coffee	110.0
Beef, corned	222.0	*Corn Flakes*, Kellogg's	92.5
Steak	203.0	Crackers:	
Fried	271.0	Cream	77.8
Stewed	287.0	Plain	83.4
Topside	212.0	Sweet	31.8
Stewed	341.0	Cranberries, raw	11.1
Beers:		Cream	33.0
Pale ale, draught	23.2	Cucumber, raw	11.0
Bottled	23.8	Currants, black, raw	33.1
Mild ale, draught	20.4	Red, raw	28.6
Bottled	25.2	White, raw	23.6
Strong ale	34.1	Dried	30.8
Stout	23.1	Curry powder	86.0
Beets, boiled	22.1	Dates	51.0
Blackberries	12.5	Doughnuts	56.4
Bovril	362.0	Duck, roast	395.0
Brains, sheep	108.0	Eel	130.0
Brazil nuts	293.0	Egg white	182.5
Bread, white	54.5	Yolk	164.5
whole wheat	76.0	Eggplant, raw	9.0
Broccoli tops, boiled	45.0	Endive	25.7
Brussels sprouts, boiled	77.8	Fat, dripping	9.2
Buns, currant	73.4	Figs, dried	80.8
Butter	9.1	Green	12.9
Cabbage, red, raw	68.0	Fish paste	185.0
Savoy, boiled	30.4	Flour, white	108.5
Spring, boiled	26.7	Whole wheat	123.5
Winter, boiled	23.4	*Force*	105.0
Cantaloupe	11.7	Fruit salad, canned	1.8
Carrageen moss, dried	5460.0	Ginger, ground	[illegible]
Carrots, old, raw	6.9	Goose, roast	326.0
Boiled	5.0	Gooseberries, green	15.9
Young, boiled	9.3	Ripe	13.5
Cauliflower, boiled	29.4	Grapefruit	5.1
Celeriac, boiled	12.8	*Grape-Nuts*, Post's	145.0
Celery, raw	14.9	Grapes, black	7.4
Boiled	8.3	White	9.1

* Masters, M., and McCance, R. A.: Biochem. Jour., **33**, 1308, 1939.

Food items.	Mg. %.	Food items.	Mg. %.
Haddock, fresh	226.0	Peaches	5.7
Smoked	221 0	Canned	1 0
Steamed	227 0	Dried	240.0
Hake	164 0	Peanuts	377.0
Ham, boiled	233 0	Pears, cooking (raw)	3 4
Hare, roast	347 0	Eating	2 7
Hare, stewed,	320 0	Canned	1 3
Hazelnuts	74 5	Peas, fresh, raw	50 0
Herring	212 0	Boiled	43 5
fried	270 0	Dried, raw	129 0
Honey	0 8	Boiled	39 0
Honeycomb	0 8	Split, dried, raw	166 0
Horseradish	212 0	Boiled	45.7
Ice-cream	30 6	Canned	43 9
Jam, edible seeds	6 5	Pepper	99 2
Stone fruits	3 2	Pheasant, baked	302 0
Jelly, com.	36 6	Pineapple	2 6
Kippers	225 0	Canned	2 7
Lamb cutlet	166 0	Plaice	203 0
Lard	24 8	Fried	246 0
Leeks, boiled	48 9	Plums, cooking (raw)	4 6
Lemons, whole	12 3	Damson	6 4
Juice	2 0	Eating	3 5
Lentils, raw	122 5	Greengage	3 0
Boiled	37 3	Pomegranate juice	4 2
Lettuce	11.8	Pork, leg	195 0
Loganberries	18 1	*Post Toasties*	83 0
Canned	3.0	Potatoes, new, boiled	24 3
Macaroni	95 0	Old, raw	34 6
Mackerel	162 0	Boiled	22.2
Malted Milk, Horlick's	167.0	French fried	44.7
Margarine	12.1	Roast	56 3
Marmalade	2 1	Prawns	335 0
Marmite (*Vegex*)	382.0	Prunes	18 5
Meat paste	131.0	Pumpkin, raw	9 5
Milk, fresh, whole	29 2	Rabbit	169 0
Condensed whole, unsweetened	75.0	Rabbit, stewed	245.0
Condensed whole, sweetened	82 5	Rabbit, *see* Hare.	
Condensed skim, sweetened	94 3	Radishes	37.5
Mince meat	28.4	Raisins	23 0
Molasses, *see* Treacle.		Raspberries	17.3
Mulberries	8.8	Rhubarb	8.2
Mushrooms, raw	33 8	Rice	78 5
Fried	73 8	Roe, cod's	212 0
Mussels	326 0	Herring's	175 0
Boiled	262 0	Rusk	107 0
Mustard	1280 0	*Ryvita*	87 0
Mustard and cress, raw	170 0	Sago (tapioca)	0 5
Mutton chop	197 0	Salmon	192 0
Leg	164 0	Canned	241 0
Nectarines	10 0	Canned in oil	246 0
Oatmeal	155 0	Salsify, boiled	25 2
Olives, brined	35 6	Salt, table	29 0
Onions, raw	50 7	Sausages, beef, fried	163 0
Boiled	23 7	Black	173 0
Fried	87 8	Breakfast	78 5
Spring, raw	50 0	Pork, fried	95 [illegible]
Oranges, whole	9 0	Scallops	[illegible]
juice	4 6	Seakale, boiled	[illegible]
Ovaltine	183 0	Semolina	[illegible]
Oxo	321 0	Shrimp	[illegible]
Parsnips, raw	16 5	Smelts	[illegible]
Boiled	14 6	Sole, Dover	[illegible]
Passion fruit	18 7	Spinach, boiled	[illegible]

TABLE 42 (CONTINUED).—The Sulfur Content of Various Foods.

Food items.	Mg. %.	Food items.	Mg. %.
Sprats, smoked	222.0	Trout, rainbow	169.0
Spring greens, boiled	28.5	Turbot	188.0
Strawberries	13.4	Turkey, roast	234.0
Suet	20.0	Turnips, raw	22.1
Sugar, Demerara	14.0	Boiled	21.2
Swedes, raw	39.1	Turnip tops, boiled	39.0
Boiled	30.5	Veal	191.0
Sweet potatoes, boiled	14.9	Vegetable marrow, boiled	5.5
Syrup, "golden," corn	53.8	*Vegex*	382.0
Tangerines	10.3	Vinegar	18.6
Tapioca (minute)	3.5	Walnuts, English	104.0
Tea	177.0	Watercress	127.0
Tomatoes, raw	10.7	Whelks	401.0
Fried	9.2	Whiting	257.0
Treacle, black	68.5		

BROMINE CONTENT OF FOODS.

Introduction.—Geographic location and climatic conditions are determining factors in the bromine content of foodstuffs. Those of marine origin or grown near the sea are always relatively richer than those produced inland. Comparative data are shown in Table 43. There is also a selective affinity on the part of the different plant tissues. The green parts are invariably richer than the roots of the same plant. Cereal grains are relatively low in bromine. Although fruits frequently contain very little of this element, there are outstanding exceptions as watermelon, musk-melon, and tomatoes.

Methods for ascertaining the bromine content of foods are thoroughly discussed by Neufeld. Analyses by this investigator compare on the whole with those of Damiens and Blaignon, although the latter tend to be higher. The source of the French material is not so clearly defined as in the case of the figures from western Canada.

TABLE 43.—**Bromine Content of Some Foods.***

Food items.	Br in dried material, mg. %.	Food items.	Br in dried material, mg. %.
Almonds (Fr.)	Negligible	Milk (i)	0.096
Apples (c)	0.30	Millet (Fr.)	0.38
(Fr.)	Trace	Mushrooms (Fr.)	0.19–3.62
Apricots (Fr.)	0.28	Muskmelon (Fr.)	9.45
Artichokes (Fr.)	0.98	Oats (Fr.)	0.23–0.39
Jerusalem (Fr.)	0.62	Onions (Fr.)	0.10–0.22
Asparagus (Fr.)	2.02	Oranges (Fr.)	0.32
Bananas (Fr.)	0.54	Oranges (c)	0.60
Barley (Fr.)	0.55–0.56	Peel	0.45
Beans, favé (Fr.)	0.18	Parsnips (i)	1.30
Haricot verts (Fr.)	0.64	Peaches (c)	<0.20
Mature (Fr.)	Trace	(Fr.)	Traces-0.47
Beets (i)	<0.20		
(Fr.)	0.37–0.55	Pears (c)	0.60
Bread, white (Fr.)	0.09–0.61	(Fr.)	Negligible
Whole wheat (Fr.)	0.68	Peas, mature (Fr.)	0.21
White (i), unwrapped	0.70	Pods (Fr.)	0.63
Wrapped	0.30	Plums (Fr.)	Negligible
Cabbage (c)	2.50	Potatoes (i)	<0.20
(i)	0.20	(Fr.)	0.27–1.43
(Fr.)	0.45	Quinces (Fr.)	negligible
Carrots (c)	3.60	Radishes (Fr.)	0.83
(i)	<0.20	Raspberries (c)	0.90
(Fr.)	0.39	(Fr.)	Trace
Cauliflower (Fr.)	0.67–0.73	Rhubarb (i)	0.90
Celeriac (Fr.)	0.38–0.47	(Fr.)	0.75
Celery (c)	17.6	Rice (Fr.)	Trace
Cherries (Fr.)	Trace	Rye (i)	0.55†
Corn (i)	0.6†	(Fr.)	0.19
(Fr.)	0.15–0.19	Shallots (Fr.)	0.52
Cucumber (i)	4.0	Strawberries (Fr.)	0.71
Currants, black (Fr.)	0.094	Tangerines (Fr.)	0.53
Red (Fr.)	0.088–0.17	Tomato (c)	1.40
Figs (Fr.)	0.18	(i)	0.30
Flour (Fr.)	0.09–0.12	(Fr.)	0.95–5.34
Fungi, edible (Fr.)	0.19–3.62	Turnips (c)	2.40
Garlic (Fr.)	0.44	(Fr.)	0.31–0.89
Grapes (c)	1.10	Turnip greens (c)	4.25
(Fr.)	0.195	Watermelon (Fr.)	26.20
Grapefruit (c)	0.90	Wheat (i)	0.10†
Peel	<0.30	(Fr.)	0.21
Leeks (Fr.)	0.30	Wheat-germ flour (i)	0.10
Lentils, dry (Fr.)	1.00	Oil (i)	<0.03
Lettuce (i)	1.90	Yeast, top (Fr.)	0.30

* Data from Neufeld, A. H. (Canad. Jour. Res., **14**, Sec. B., 160, 1936) are grouped according to source of food as inland (i) or coastal (c); analyses of Damiens, A., and Blaignan, S. (Compt. rend., **193**, 1460, 1931; Ibid., **194**, 2077, 1932) are indicated by (Fr.)

† On fresh basis.

IODINE IN FOODS.

Introduction.—Methods for determination of iodine where it occurs in minute amounts are far from satisfactory. No figure has been included in Table 44 which was not considered acceptable. The analytical difficulties, however, must not be overlooked. Since iodine in many instances is a highly variable and accidental constituent of food, the tabulated data should be carefully evaluated.

Iodine analyses are reported on both the wet and dry basis. Because of the wide variation in the water content of food samples, and because of the minute concentration of iodine, data on the desiccated material are more satisfactory to the analyst. Figures on the fresh food, however, are more readily evaluated by the layman. The iodine concentration is expressed in a variety of ways: as parts per million or billion (thousand million), as gamma (γ) per cent, as micrograms per kilogram, as milligrams per kilogram. A microgram (γ or μg.) is 0.001 mg. or one-millionth of a gram.

$$\begin{aligned} \text{mg. I per kg.} &= \text{p.p.m.} \\ 1000\ (\text{mg. I per kg.}) &= \text{p.p.b.} \\ \gamma \text{ per gram} &= \text{p.p.m.} \\ \gamma \text{ per cent} &= \text{p.p. 100 m.} \\ \gamma \text{ per kilo} &= \text{p.p.b.} \end{aligned}$$

For example, 0.450 mg. I per kg. = 0.450 p.p.m. = 450 p.p.b. = 450 γ per kg.

Preserved fish and fishery products contain iodine in quantities comparable to those of fresh fish. Fish roes are especially rich in iodine. Liquors from canned shell-fish have a high iodine content. There are a few sea-foods which rank higher in iodine content than the oyster, but these are usually not so widely distributed, nor so readily obtainable. The iodine of shrimp and crab is concentrated largely in the non-edible portion (Coulson).

The iodine content of plants is at a maximum in autumn and winter. Plants grown on the same soil take up varying amounts of iodine. Onions and asparagus appear to pick up more than cabbages. The latter in turn exceed the legumes which absorb more iodine from the earth than the cereals. The fruits take up still less iodine. Iodine uptake tends to vary directly with the water available for the growing crop.

Iodine is more plentiful in those parts of plants where green coloring matter is most intense. Young green leaves contain more than etiolated leaves, stems more than roots, and leaves than stems (Heller *et al.*, 1935).

The effect of cooking upon Chinook salmon is given by Jarvis.

Raw	144 p.p.b. (fresh)	Raw	524 p.p.b.	Raw	522 p.p.b.
Baked	122 p.p.b. (fresh)	Boiled	528 p.p.b.	Fried	566 p.p.b.

Table 44.—Iodine Content of Various Foods.
(*Italicized letters* indicate trade names.)

Food items.	Source	D = dry F = fresh	Parts per billion.
Abalone	Pacific Coast	F	1,053
Agar-agar		F	1,660
Albacore	Pacific	F	445
Albacore*	Pacific	D	790
Alewives‡		F	260
		D	500
Alfalfa	Nebraska	D	69
Alfalfa	Goitrous region	D	47
Alfalfa	N. goitrous region	D	64
Almond		D	20
Almond oil		D	50
Apples	Nebraska	D	89
Apples	Oregon, goitrous	D	3
Apple sauce	Ohio	F	125
Artichokes	South Carolina	D	182
Asparagus	California	D	12
Asparagus	Pennsylvania	F	108
		D	1,080
Asparagus	South Carolina	D	285
Asparagus†	Ohio	F	51
Bacon	Ohio	F	162
Banana	America	F	200
Banana	Spain	F	5
Banana	Italy	F	28
Barley	N. goitrous	D	73
Barracuda	Pacific	F	294
Bass, black	Iowa, Mississippi River	F	10
		D	40
Bass, black	Potomac River	F	50
		D	190
Bass, black	Washington	F	178
Beans*	Mississippi	D	994–1,315
Beef, roasted	Ohio	F	92
Beet tops	South Carolina	D	657
Beets	California	D	8
Beets	Florida	D	220
Beets	Oregon	D	19
Beets	South Carolina	D	182
Beets†	Ohio	F	38
Bing cherries	Oregon, goitrous	D	33
Black bullhead	Iowa, Mississippi River	F	10
		D	40
Blueberries	South Carolina	D	206
Bluefish		F	260
		D	1,870
Bluegill	Iowa, Mississippi River	F	40
		D	180
Bowfin	Iowa, Mississippi River	F	20
		D	80
Bread, white	Ohio	F	132
Bread, whole wheat	Ohio	F	108
Broccoli†	Ohio	F	37
Buffalofish	Iowa, Mississippi River	F	30
		D	130
Buffalofish, big mouth	Iowa, Mississippi River	F	20
		D	80
Buffalofish, razorback	Iowa, Mississippi River	F	20
		D	80
Burbot	Atlantic	D	800
Butter	Ohio	F	147
Cabbage	Florida	D	188

* Canned. † Cooked. ‡ Smoked.
N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food items	Source.	D = dry. F = fresh	Parts per billion
Cabbage	Nebraska	D	62
Cabbage	South Carolina	D	263
Cabbage	Goitrous	D	7
Cabbage	N. goitrous	D	30
Cabbage†	Ohio	F	20
Cabbage, Chinese	Ohio	F	21
Cabbage, Chinese	South Carolina	D	300
Cantaloupe	Ohio	F	23
Carp	Iowa, Mississippi River	F	10
		D	40
Carp	Washington	F	12
Carrots	California	D	8
Carrots	Florida	D	240
Carrots	Nebraska	D	220
Carrots	Oregon, goitrous	D	2
Carrots	South Carolina	D	213
Carrots	N. goitrous	D	170
Carrots†	Ohio	F	11
Castor oil		D	43
Catfish	South Carolina	F	420
		D	1,940
Catfish, channel	Iowa, Mississippi River	F	10
		D	40
Celery	California	D	14
Celery	Ohio	F	123
Celery leaves	Florida	D	655
Celery stalks	Florida	D	291
Chard, Swiss	Florida	D	992
Cheese, cottage	Ohio	F	61
Cherries	America	D	33
Chestnuts		F	15
Chocolate		D	30–80
Chocolate beverage	Ohio	F	65
Cisco‡	Lake Erie	F	240
		D	550
Cisco roe‡	Lake Erie	F	270
		D	870
Clams, hard	America	F	1,370
		D	6,200
Clams, Little Neck	Pacific	F	833
Clams, minced	New England	F	420
		D	1,970
Clams, razor	Pacific	F	1,382
Cocoa		D	80
Cocoa butter		D	87
Cocoanut oil		D	95
Cod	America	F	240
		D	1,000
Cod	Massachusetts and New York	F	1,030
		D	5,350
Cod	Pacific	F	254
Cod, salt		F	660
		D	1,200
Codfish, buck roe		D	2,230
Codfish cakes*		F	340
		D	1,150
Codfish roe*		D	1,510
Codfish, shredded*		F	310
		D	1,520
Cod-liver oil	Maine and New York	D	7,670
Cod-liver oil, crude	Scandinavia	D	3,370
Cod-liver oil, refined	Scandinavia	D	7,200

* Canned. † Cooked. ‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food item.	Source.	D = dry. F = fresh.	Parts per billion.
Coffee	Brazil	D	80
Collards	Florida	D	127
Collards	Georgia	D	18–140
Collards	South Carolina	D	232
Conch	Florida	F	290
		D	1,140
Corn	Goitrous	D	4
Corn	Nebraska	D	0
Corn	N. goitrous	D	52
Corn	Kentucky	D	68–720
Corn, Country Gentleman*	Maryland	D	43
Corn, sugar*	Maryland	D	33
Corn, sweet	Pennsylvania	F	23–73
		D	90–250
Corn†	Ohio	F	52
Crabs, Dungeness	Pacific	F	102
Crabs, King	Pacific	F	362
Crabs, soft		D	490
Crabmeat	South Carolina	F	425
		D	1,750
Crabmeat*	Oregon	F	148
		D	750
Crabmeat*	Virginia	F	420
		D	1,180
Crabmeat*	Japanese	D	3,150
Crabmeat flakes, blue	America	F	180
		D	870
Cranberries	Cape Cod	D	100
Cranberries	Cape Cod	F(?)	26–37
Cream, 20 per cent	Ohio	F	57
Cream, whipped	Ohio	F	72
Cucumbers	Florida	D	212
Cucumbers	South Carolina	D	530
Dasheens	Florida	D	228
Dates	Italy	F	5
Dewberries	Florida	D	110
Dewberries	South Carolina	D	169
Eel		D	800
Egg	Ohio	F	108 per egg
Eggplant	Florida	D	147
Eggplant	South Carolina	D	187
Figs, dried	Italy	F	12–69
Finnan haddie*		F	230
		D	820
Flounder	Atlantic	F	290
		D	1,180
Flounder	Washington	F	233
Flounder, winter		F	180
		D	730
Flounder, winter	Cape Cod	F	53
Gar pike	Mississippi River	F	10
		D	40
Grapes, dried	Spain	F	120
Grape juice	Ohio	F	9
Grapefruit		F	13
Haddock	America	F	290
		D	1,050
Haddock	Massachusetts	F	5,630
		D	2,900
Haddock	New York	F	1,647
		D	9,070

* Canned. † Cooked. ‡ Smoked.
N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food items.	Source	D = dry F = fresh	Parts per billion.
Haddock, salted		F	320
		D	680
Halibut	America	F	250
		D	830
Halibut	Washington	F	304
Hazelnuts		D	15
Herring	Washington	F	214
Herring, salted		F	490
		D	890
Herring‡		F	530
		D	1,000
Herring milt‡		D	600
Herring roe	Washington	F	951
Herring roe*		D	3,790
Herring roe‡		D	800
Kale	Florida	D	250
Kale	South Carolina	D	278
Lamb chop	Ohio	F	146
Lard	America	D	7
Lemon juice		F	52
Lemonade	Ohio	F	68
Lettuce	Florida	D	215
Lettuce	Georgia	D	298 428
Lettuce	Nebraska	D	71
Lettuce	Ohio	F	42
Lettuce	South Carolina	D	912
Lettuce	Goitrous	D	8
Lettuce	N. goitrous	D	30
Lima beans	Maryland	D	50
Lima beans, green*	Maryland	D	37–69
Ling		D	1,200
Ling cod	Washington	D	138
Linseed oil		D	54
Lobster	America	F	1,380
		D	11,590
Lobster, spring	Pacific	F	322
Lobster*		F	1,330
		D	5,320
Loganberries	Oregon	D	160
Mackerel, common	Massachusetts	F	530
		D	1,280
Mackerel, common, salted		F	400
		D	660
Mackerel, Spanish		F	400
		D	1,410
Mackerel, Spanish	Washington	F	230
Mate	Brazil	D	160
Mayonnaise	Ohio	F	271
Milk, whole	Maryland	D	67
Milk, whole	Nebraska	D	320
Milk, whole	Ohio	F	33
Milk, whole	Goitrous	D	10
Milk, whole	N. goitrous	D	25
Milk, skim	Maryland	D	91
Milk, skim	Minnesota	D	12
Milk, malted	Ohio	F	84
Milk, goat's	California	D	400
Mullet	Florida and South Carolina	F	4,850
		D	20,490
Mullet, salted		F	290
		D	560

* Canned. † Cooked. ‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food items.	Source	D = dry. F = fresh	Parts per billion.
Mussels	Atlantic	D	1,900
Mussels	Pacific	F	802
Mussels, sea*		F	970
		D	2,860
Mussels, liquor*		D	6,720
Mustard greens	Mississippi	D	633
Mustard greens	South Carolina	D	224
Oats	Minnesota, goitrous	D	10
Oats	N. goitrous	D	23–175
Oats, rolled†	Ohio	F	157
Okra	South Carolina	D	223
Olive oil		D	66
Onions	Florida	D	209
Onions	Nebraska	D	0
Onions	South Carolina	D	222
Orange juice		F	15
Oysters	Atlantic	F	1,160
		D	6,000
Oysters	Maryland	D	604–829
Oysters	Pacific	F	935
Oysters	Japan	F	798
Oysters*		F	350
		D	4,010
Oysters, liquor*		D	9,600
Oyster juice, fresh		F	120
		D	3,170
Peaches	Oregon, goitrous	D	11
Peaches	South Carolina	D	162
Peaches*	Ohio	F	161
Peanuts	Spain	D	200
Peanut oil		D	30
Pears	Nebraska	D	98
Pears	Oregon, goitrous	D	15
Pears, green	California	D	8
Pears, ripe	South Carolina	D	65
Pears, Bartlett*	Ohio	F	22
Peas	California	D	9
Peas*	Pennsylvania	D	65
Pep, Kellogg		F	90
Peppers, Bell	Florida	D	198
Perch, salt water	Pacific	F	176
Perch, white		F	420
		D	1,420
Perch, yellow	Potomac River	F	20
		D	90
Periwinkle		D	750
Pickerel	Potomac River	F	70
		D	300
Pimentos	Georgia	D	22
Pimentos	South Carolina	D	150
Pineapple*		F	22
Plums, fresh	Ohio	F	47
Pollock		F	120
		D	900
Pollock	Massachusetts	F	430
Pompano		F	80
		D	250
Poppyseed oil		D	33
Potatoes	Florida	D	173
Potatoes	Georgia	D	18–140
Potatoes	Idaho	D	110
Potatoes	Maine	D	195

* Canned. † Cooked. ‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food item.	Source.	D = dry. F = fresh	Parts per billion
Potatoes	Maryland	D	38–68
Potatoes	Michigan	D	94
Potatoes	Minnesota	D	86
Potatoes	Nebraska	D	Trace
Potatoes	North Dakota	D	78
Potatoes	Pennsylvania	F	40–93
		D	150–240
Potatoes	South Carolina	D	211
Potatoes	Goitrous	D	8
Potatoes	N. goitrous	D	350
Potatoes, boiled	Ohio	F	34
Potatoes, mashed	Ohio	F	41
Potatoes, sweet	Florida	D	101
Potatoes, sweet	South Carolina	D	98
Prunes	Oregon	D	5
Prunes, dried†	Ohio	F	50
Raisins	Europe	F	32
Ray		D	200
Rice	India	F	10
Rice	Italy	F	32
Rice Krispies, Kellogg		F	151
Rutabaga	South Carolina	D	200
Rutabaga tops	Mississippi	D	312
Rye	N. goitrous	D	3
Sago		D	42
Salmon, Chinook	Washington	F	364
Salmon, Chinook*	Alaska	F	670
		D	2,010
Salmon, Chum	Washington	F	242
Salmon, Chum*	Alaska	F	220
		D	810
Salmon, Coho*	Alaska	F	230
		D	760
Salmon, pink	Washington	F	264
Salmon, pink*	Alaska	F	210
		D	670
Salmon, red	Washington	F	405
Salmon, red*	Alaska	F	530
		D	1,710
Salmon, silver		F	206
Salmon, sockeye	Washington	D	1,261
Salmon, steelhead	Washington	D	1,314
Salmon oil	Alaska and Washington	D	1,980
Sardines*	California	D	1,050
Sardines*	Maine	D	1,510
Sardines, salted		D	600
Sardine oil	California	D	260
Sardine oil	Maine	D	470
Scallops	Pacific	F	799
Scallops, giant		F	150
		D	810
Scup		F	300
		D	950
Seaweed, dried	Atlantic	D	900
Sesame oil		D	30
Shad	Washington	F	306
Shad roe	Washington	F	1,182
Shad roe*	Washington	F	4,100
Shrimp	Pacific	F	875
Shrimp	Georgia, Louisiana and South Carolina	F	230
		D	1,100
Shrimp, headed		F	450
		D	2,250

* Canned † Cooked. ‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food item.	Source.	D = dry. F = fresh.	Parts per billion.
Shrimp*		F	380
		D	1,140
Shrimp†	Georgia and Alabama	F	210
		D	710
Smelt		F	10
		D	70
Smelt	Columbia River	F	309
Snapper, red	Florida and Alabama	F	310
		D	1,440
Snapper, red	Washington	F	280
Soup vegetables	Oregon, goitrous	D	13
Spinach	California	D	32
Spinach	Florida	D	657
Spinach	Georgia	D	296–1,079
Spinach	Maryland	D	330–346
Spinach	Nebraska	D	116
Spinach	Oregon, goitrous	D	20
Spinach	South Carolina	D	693
Spinach	N. goitrous	D	32
Spinach†	Ohio	F	55
Squash	Florida	D	136
Squash, summer	South Carolina	D	625
Squid	Pacific	F	209
Strawberries	Florida	D	197
Strawberries	South Carolina	D	181
String beans	Florida	D	267
String beans	Maryland	D	58–75
String beans	Pennsylvania	F	20–33
		D	170–270
String beans	Oregon, goitrous	D	29
String beans	South Carolina	D	210
String beans*	Mississippi	D	70–90
Sturgeon	Washington	F	629
Sugar		F	162
Tapioca		D	12
Tea	Ceylon	F	80
Tea, green	China	F	73
Tomatoes	California	D	20
Tomatoes	Nebraska	D	130
Tomatoes	Ohio	F	26
Tomatoes	Pennsylvania	F	5–19
		D	90–370
Tomatoes	South Carolina	D	112
Tomatoes*	Florida	D	133
Tomatoes*	Maryland	D	16–65
Tomatoes*	Mississippi	D	100
Tomato juice	Ohio	F	47
Trout	Lake Erie	F	10
		D	40
Trout, brook	Washington	F	17
Trout, rainbow	Washington	F	42
Trout, salmon		D	100
Trout, steelhead	Washington	F	377
Tuna, bluefin	Pacific	F	380
Tuna, bluefin*		F	160
		D	390
Tuna, yellowfin	Pacific	F	340
Turnip tops	Florida	D	2,296
Turnip tops	Georgia	D	111–634
Turnip tops	Mississippi	D	364
Turnip tops	South Carolina	D	376
Turnips	Florida	D	235
Turnips	South Carolina	D	271

* Canned. † Cooked. ‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food items.	Source.	D = dry, F = fresh.	Parts per billion
Veal	Ohio	F	68
Vegex (Marmite)		F	180
Walnuts		D	30
Whale steak*		F	<10
		D	<40
Watermelon	South Carolina	D	402
Wheat	Canada	D	3–6
Wheat	Minnesota, N. goitrous	D	1–7
Wheat	Nebraska	D	0
Wheat	N. goitrous	D	4–9
Wheatena		F	30
Whitefish	Lake Erie	F	30
		D	110
Whiting		D	300

* Canned. † Cooked. ‡ Smoked

N. goitrous = non-goitrous.

ANTITHYROID EFFECT OF FOODS IN MAN

It is recognized that goiter may develop in laboratory animals or in man despite presumably adequate intake of iodine. Over the past 20 years evidence has been accumulating to indicate that there are agents in certain foods which are capable of inhibiting the utilization of iodine by the thyroid gland. Probably more than one such substance possesses activity as heating is destructive in some instances but not in others. Apparently water-soluble, the active principle may be leached out in cooking water. It is unlikely that the iodine content of any of the foods, except clams and oysters, was great enough to diminish uptake of I^{131}. Individual foods may show a variable effect: cabbage, for example, becomes more potent with approach of winter. Many persons undoubtedly consume quantities of such food without visible effect, but occasionally the circumstances are just right for thyroid hyperplasia

TABLE 45.—**Goitrogenic Foods***

Food items.	*Grade.*	*Food items.*	*Grade.*
Almonds, raw	0	Milk, past.	0 to 2
Apples, raw	0	Mustard, dry	0
Apricots, dried	1	Mushrooms, cooked	0
Bananas, raw	0	Olives, pickled green	0
Beans, baked, canned	1	Onions, raw	0
black, cooked	0	Orange juice, fresh	1
lima, cooked	0	Oysters, raw	0 to 2
string, raw	1 to 2	Peaches, froz.	2
cooked	0	Peanuts, raw or roasted	1 to 2
Beefsteak, raw	0	Pears, raw	1 to 2
Beets, cooked	1	juice, fresh	2
Blackberries, froz.	0	canned	0
Broccoli, cooked	0	Peas, raw or cooked	1 to 2
Bonita, canned	0	Pineapple, canned	0
Cabbage, raw	0 to 3	Potatoes, raw or boiled	0
Carrots, raw	0 to 3	Radishes, raw	0
cooked	1	Raisins, Thompson seedless	1 to 2
Cauliflower, cooked	0	Raspberries, froz.	0
Celery, raw	0 to 3	Rice, boiled	0
Cheese, Amer., past.	0	Rutabaga, raw	3 to 5
Clams, raw	1	puréed raw	2
Corn, froz.	0	juice, raw	2
Cucumbers, raw	0	cooked	0 to 1
Custard, baked	1	Rye bread	0
Dates, dried	0	Salt, NaCl	0
Filberts, raw	1	Sardines, canned	0
Grapefruit, raw	2	Shrimp, boiled	0
Grapes, fresh Tokay	0	Spinach, cooked	0 to 2
Green peppers, raw	1	Squash, banana, cooked	0
Ice cream	0	Strawberries, froz.	0 to 5
Lettuce, raw	1 to 2	Tangerines, raw	0
Liver, broiled	1	Tomatoes, raw	0
Lobster, boiled	0	juice, fresh	0
Loganberries, froz.	0	Turnips, raw or cooked	0 to 2
Melon, honey dew	1	Walnuts, raw	1 to 2

* Greer, M. A., and Astwood, E. B.: Endocrinology **43**, 105, 1948.
Antithyroid activity was measured by observing the inhibition of radio-active iodine (I^{131}) uptake according to Stanley, M. M. and Astwood, E. B.: Endocrinology **41**, 66, 1947. Foods tested were eaten to satiety and the results graded arbitrarily: 0—no inhibition; 1—slight or questionable; 2—moderate depression without complete inhibition; 3—complete inhibition for less than 4 hrs.; 4—complete inhibition from 4 to 24 hrs.; 5—complete inhibition lasting 24 hrs.

CHAPTER 9.

VITAMINS IN FOODS.

Introduction.—Full vigor and health demand for their maintenance substances other than carbohydrates, proteins, fats, minerals and water. The number of such substances discovered has been unexpectedly high and amazing progress has been made since Funk (1911) coined the word "vitamine."

Vitamins are assayed by chemical, bacteriological and biological methods, the latter involving determination of curative or prophylactic doses. Data obtained on experimental animals cannot always be applied in detail to humans who rarely exist under limitations such as can be imposed by the laboratory. Vitamin deficiency in man usually is a complex matter, making the clinical aspects difficult to evaluate. Vitamin deprivation ultimately produces widespread constitutional mal-effects. The availability of any one vitamin is not entirely a matter of its ingestion. The chemical environment in which the vitamin is elaborated and its vitamin and food associates in the alimentary canal determine in some measure the degree of its utilization. Excess in any one factor unbalances physiologic economy and may lead to a relative deficiency in some other factor. The inter-relationships among the vitamins are assuming increasing importance with advance in our knowledge of the chemical behavior of these small but vital dietary factors.

The use of letters to designate the vitamins dates back to the time when these unidentified factors could be described only as "fat-soluble A," "water-soluble B," and the like. This type of notation has been convenient but is being replaced by appropriate chemical terms, as carotene and thiamine. Since successive stages of separation and identification have left behind many terms no longer in use, a glossary is provided on page 350. This also provides a means of offering condensed information which has accumulated from vitamin investigations.

VITAMIN A.

Chemical Behavior.—Vitamin A is a primary alcohol derived from the carotinoid pigments of plants. It crystallizes in pale yellow needles which melt at approximately 8° C. and are soluble in oils and fats. It is unaffected by dilute acids and alkalies. Vitamin A is fairly stable to heat in the absence of oxygen, but is destroyed by oxidation, especially at high temperatures. Oxidation is slow at room temperature. Vitamin A, like vitamin E, is inactivated by exposure to ultra-violet irradiation and by rancidity of its fatty vehicle.

The carotinoid pigments vary in their vitamin-A values, the most active being beta-carotene. This is a crystallizable orange-red pigment, soluble in oil which, like vitamin A, is oxidized and destroyed by air, especially at high temperatures. Carotene is insoluble in water, acids and alkalies; it is sparingly soluble in alcohol.

More information is needed on the availability of the different carotenes and cryptoxanthine (also spelled kryptoxanthin). Another carotinoid pigment, lutein, has no vitamin A activity but it appears to decrease storage of this vitamin although not interfering with absorption of carotene. Since lutein is common in natural foodstuffs, possible antivitamin action should be investigated. According to Nutrition Reviews **7**, 181, (June) 1949, it is generally accepted that amounts of carotinoids needed to permit detectable vitamin A storage are about ten times greater than those necessary to prevent symptoms of avitaminosis.

The conversion of carotene or provitamin A into active vitamin was once thought to be easily accomplished by liver cells. In general, it appears that the body is extremely wasteful of carotene and while it can use it, it often does not. Vegetable sources, then, do not furnish a dependable supply of the vitamin, especially in disease.

"A" activity is shown by more than one form of vitamin A (refer to p. 361) and carotene (p. 352).

Absorption and Storage.—Vitamin A occurs in natural oils and fats as an ester. Commercial preparations may contain the free alcohol which apparently is esterified before absorption by way of the lymphatics. The vitamin is also transported and stored as a fatty acid ester. The hydrocarbon carotene cannot enter into such combination and thus is less absorbable. Bile is essential for utilization of carotene, a bile acid derivative probably being formed. The presence of bile is advantageous for the absorption of vitamin A but not altogether necessary. Since they are fat-soluble, both carotene and vitamin A are poorly absorbed from the intestines whenever fat digestion and absorption are defective. Absorption of vitamin A reaches a maximum three to five hours after administration whereas carotene requires six to seven hours. The latter may show extremely low absorption and much may be destroyed in the intestines.

Investigators disagree as to the relative loss of vitamin A and carotene through excretion in mineral oil. Prolonged use of this laxative is probably unwise except in conjunction with a diet rich in vitamin A. It is generally agreed that the oil should not be given near meals, nor should it be used by persons who depend on plant sources for their vitamin. However, the last word has not yet been said on this subject. According to the commonly accepted theory on the mechanics of fat absorption neither glycerides nor paraffin should be absorbed. Frazer, offering a different hypothesis, (1938-44) has presented experimental data showing absorption of both triglycerides and paraffin oil. Molander (1949) using rats has tested three carriers of carotene for absorption: (1) emulsified mineral oil

(particle size 0.5μ or less), (2) unemulsified corn oil, and (3) a mixture of fatty acids obtained from corn oil. The paraffin oil and its contained carotene were absorbed to the extent of 65 and 66 per cent respectively, only slightly less than the absorption shown with corn oil, and the distribution was systemic in both. The fatty acid mixture proved inefficient and carotene absorbed tended to collect in the liver. Conversion of carotene to vitamin A supposedly occurs in the liver although it is known that in rats the intestinal wall is the site of this change (Deuel, 1946–47).

The liver is the chief storage depot of vitamin A and may contain a large reserve of this factor except in infancy and early childhood. Ordinarily depletion is not rapid but fevers and infections hasten the loss from the tissues. Administration of thyroxin diminishes the reserves of this vitamin as an antagonism exists between them leading to destruction of the vitamin. In replenishing these stores, oral administration of the active vitamin is the method of choice. This route is less effective when derangement of intestinal absorption exists. Both the conversion of carotene to vitamin A and the utilization of the active vitamin are adversely affected by impaired liver function.

Vitamin A is not excreted by the kidneys unless the permeability of the renal filter bed is altered. The rôle of vitamin A in the kidneys is not clear. Given in excessive amounts, vitamin A concentration rises in kidney tissue and there is a stimulation of activity such that temporarily urea clearance is increased. A diuretic effect has been noted in persons who are subject to rapid weight changes through loss of water.

Carotene likewise does not ordinarily escape into the urine. When present in excess, it tends to accumulate in such obvious spots as callonsed areas of the skin. This yellowing of the skin differs from jaundice in that the whites of the eyes are unaffected whereas in retention of bilirubin the pigment is first noted in the eyes.

Physiologic Action and Deficiency Effects.—According to Sherman (1941) vitamin A significantly affects the general internal environment of the body. It is necessary for optimal health and vigor in both children and adults.

Deficiency of vitamin A retards growth and development in experimental animals. The retardation does not affect all tissues alike. Wolbach and Bessey (1940) have shown that expansion of the nervous system may continue after growth of bone ceases. Mechanical damage to brain, spinal cord and nerve roots occurs as a result of this unequal development.

Deficiency of vitamin A seems to exert its effects chiefly upon the epithelial tissues. The normal mucosa of the respiratory and urinary tracts and of the eyes is transformed into stratified, cornified epithelium, and with this change there is lowered resistance to infection. The increased susceptibility to respiratory, urinary and possibly other infections which occurs in vitamin-A deficiency seems

to be due to impairment of the normal epithelial barrier to invading organisms. It can be overcome by an adequate supply of the vitamin and in this sense vitamin A is "anti-infective," but there is no evidence that the use of vitamin A supplements can increase protection against infections when the epithelial surfaces are unimpaired by vitamin-A deficiency.

According to Cameron (1939) lack of vitamin A is associated with storage of water in various tissues of the body, notably in the head region in the early stages of deficiency. This may have some bearing on the increased nasal secretions seen in the common cold. It has been suggested that vitamin A may be of value in treating patients with water retention of obscure origin. Caldwell (1941) has used vitamin A and unsaturated fatty acids with success in treating nephrosis in children.

In the eye marked deficiency of vitamin A affects the conjunctiva and cornea, producing the condition known as xerophthalmia. In the skin a condition of xerosis with diminished secretion may occur, and in adolescents and adults this may appear as a follicular or papular dermatosis (phrynoderma). Marked degrees of vitamin-A deficiency may produce similar metaplastic changes in the epithelium of the urinary tract, including the bladder, renal pelvis and possibly the tubules. Whether or not these changes predispose to calculus formation is a question which is still undecided, but individuals susceptible to renal lithiasis should be assured a high intake of vitamin A. It has been reported that the tendency to form stones is increased when A deficiency is accompanied by defects of calcium and phosphorus metabolism. Vitamin A appears to protect the kidneys against damage due to injection of parathyroid hormone into rats (West and Morgan).

It is now well established that the photosensitive substance present in the retinal end-organs which enables them to react to light is a pigment formed by the combination of vitamin A with a protein. This substance, rhodopsin or visual purple, is the photo-active element in the rods. When this pigment is exposed to light it is bleached and chemically altered, apparently with the liberation of vitamin A. Even slight degrees of A deficiency affect retinal function which is manifest first, as diminished ability to see clearly in low intensities of illumination (elevated light threshold), and second, as slowness in recovering visual acuity after the retina has been bleached by exposure to a bright light. The first effect is responsible for the clinical condition known as hemeralopia or night blindness, but even persons unaware of inability to see well in relative darkness may be much slower than normal in recovering vision after exposure to a bright light, such as the glare of an automobile headlight.

Clinical Estimation of Deficiency. Slow recovery from bleaching and defective adaptation to darkness are the most delicate indices of vitamin-A deficiency at present available. In recent years they have been made the basis of tests for clinical vitamin-A deficiency

and a number of photometers have been developed for testing these functions. The principle employed is that of exposing the eyes to a definite bright light for a fixed period of time to bleach the retina and then measuring the amount of illumination required to distinguish a test object at intervals during the period of recovery or determining the time required for recovery of vision at an arbitrary degree of reduced illumination. In the presence of deficiency, recovery is both slow and incomplete. While the test is undoubtedly valuable, there has been a tendency to overestimate its reliability and specificity. To be reliable an exacting technic must be followed and all other possible causes of diminished visual function excluded. Vitamin A deficiency is demonstrated, not so much by the finding of poor adaptation, as by improvement under therapeutic administration of this factor. Normal response to the photometric test indicates very recent satisfactory intake of vitamin A and may be associated with a low blood level, thereby suggesting inadequacy of vitamin stores.

Investigations by Wise and Schettler (1938) suggest that persons whose occupation requires a high degree of visual acuity, of dark adaptation, or of exposure to brilliant light should be assured an abundant supply of vitamin A.

The concentration of vitamin A in blood plasma may be ascertained by the production of a fleeting blue color with antimony trichloride. Accuracy is possible only with a photoelectric instrument capable of indicating the point of maximum color development. Results are expressed in abstract values as "blue units" or mathematical expressions related to the galvanometer readings of the colorimeter.

The carotene content of plasma may be readily determined and varies around 0.1 mg. per cent. Ingestion of this pigment raises the blood level and may lead to its deposit in certain tissues, notably calloused areas on the hands and soles where it apparently awaits destruction or excretion in the sebaceous glands. There is no consistent relationship between the plasma carotene and vitamin A concentrations and single determinations are not a reliable index of vitamin A stores in the tissues.

Requirement. The minimal requirement for the adult has been placed at 20 to 30 I.U. per kilo daily (Booher, 1939) but is it generally believed that 40 I.U. is a safer minimum. The recommended allowance for vitamin A is 1500 I.U. for children under one year, 2000 up to 3 years, 2500 up to 6 years, 3500 from 7 to 9 years, 4500 from 10 to 12 years, 5000 for girls over this age, and 5000-6000 for teen-age boys. Adults are advised to take 5000 U.I. Pregnancy and lactation raise the requirement to 6000 and 8000 I.U. respectively. These allowances are based on the premise that approximately two-thirds of the vitamin A value of the average American diet is con-

tributed by carotene and that carotene has half or less than half the value of vitamin A.

Sources.—In general, the carotinoids are the plant sources of vitamin A while both carotene and active vitamin occur in animal products, such as butter, egg-yolk, liver, and fish liver oils. The **International Unit**, identical with the U.S.P. unit, is equivalent to 0.6 μg. of pure β-carotene.

Carotene and xanthophyll are responsible for much of the yellow color in plants. Green pigments may mask carotinoids; chlorophyll itself provides no vitamin A. In general, provitamin A is present in proportion to the depth of color in plant foods. Yellow vegetables, therefore, are superior to the corresponding white varieties but only insofar as vitamin A is concerned. Likewise, dried green peas are better than the yellow variety. Carrots, sweet potatoes and pumpkin rate highest among the yellow vegetables, but yellow turnips are a poor source of vitamin A. The green leafy vegetables are outstanding in their content of provitamin A; the greener and thinner the leaf, the better.

Among animal sources, fish-liver oils rank highest; they are rich in vitamin A and relatively low in carotene. Shark-liver oil is outstanding in its A content. Egg-yolk and butter fat (milk, cream, butter, cheese) are excellent sources; their color is of limited value in judging their vitamin-A potency since both the pigment carotene and the colorless vitamin occur in variable proportions. One quart of milk contains sufficient vitamin on the average to meet the daily minimum vitamin requirement of an adult (Moore, 1939). Cow's milk contains only one-tenth to one-fourth the vitamin-A content of human milk (Yudkin, 1939).

For supplementing the diet, when this is indicated, fish-liver oils are preferable to purified carotene or purified vitamin-A preparations.

Fish vary from zero to high values, even in the same group as salmon which one would ordinarily expect to be rich in vitamin A. Products canned in vegetable oils thereby acquire vitamin E but no A. Fish either low in fat or deprived of natural oil are not likely to furnish much vitamin A.

Provision of adequate vitamin A or carotene calls for simultaneous availability of vitamin E. Hence green leafy vegetables are superior to the yellow fruits and vegetables in this respect. Additionally, vitamin C in conjunction with E enhances A value. It would, therefore, seem worthwhile to plan food combinations to carry all three of these vitamins, as sweet potatoes and greens. An orange provides carotene, ascorbic acid and some vitamin E.

Overdosage.—No harm has been reported from liberal administration of vitamin A but massive doses, as 300,000 I.U. daily, may not be tolerated well.

Good Sources of Vitamin A

Butter
Cheese, whole milk
Cream
Eel
Egg-yolk
Fish liver oils
Fish (questionable)
Fish roe
Honeycomb
Kidney
Liver
Margarine (fortified)
Oysters
Suet, beef

Good Sources of Carotene

Preferred: leafy green vegetables

Broccoli
Beet tops
Chard
Collards
Dandelion greens
Endive (escarole)
Kale
Spinach
Turnip greens
Watercress

Secondary: green and yellow foods

Apricots
Asparagus, green
Beans, snap
Carrots
*Mango
*Papaya
Peaches, yellow
*Persimmons
Prunes
Pumpkin
Peas, green
*Peppers, green
*Sweet potatoes
Squash, winter

* Good vitamin C source.

VITAMIN B COMPLEX

"Vitamin B" was the first of the food accessories to be recognized. Known as "water-soluble B," it was assumed to be a single substance. Investigations into its nature, however, have yielded a procession of compounds which probably is not yet complete: thiamine, riboflavin, nicotinic acid, pyridoxine, pantothenic acid, biotin, inositol, choline, p-aminobenzoic acid, folic acid and vitamin B_c. Whether all of these are essential for human nutrition or not remains to be seen. However, members of this group have been demonstrated as necessary to all forms of life from the lowest to the highest, emphasizing the universality and fundamental character of these factors (R. J. Williams, 1941).

THIAMINE.

Chemical Behavior. Thiamine chloride is a colorless, crystalline substance, $C_{12}H_{17}ON_4SCl$, characterized by a yeast-like odor, marked solubility in water, slight solubility in alcohol and insolubility in oils. Since it is readily adsorbed, clarification of liquid foods by filtration through fuller's earth, charcoal, and the like may result in appreciable loss of this vitamin. Charcoal, therefore, should not be prescribed under conditions where it will interfere with absorption of ingested thiamine.

The vitamin B_1 commercially available is thiamine hydrochloride with 1 molecule of water of hydration. In aqueous solution (1 to 20) a pH of approximately 3.5 is observed. Such solutions may be sterilized without loss by heating to 120° C. for thirty minutes or more, the stability depending upon the highly acid reaction (Molitor and Sampson, 1936).

Greengard (1940) has reported upon the numerous pharmaceutical incompatibilities of thiamine chloride. On standing at room temperature for several months, aqueous alcoholic solutions precipitate thiochrome (oxidation product) which has no vitamin activity. Elixirs, therefore, should be used within sixty days. Since tannic acid precipitates thiamine chloride, only detannated wines should be used as a vehicle for this vitamin. Iron-and-ammonium citrate and ferrous sulfate should not be administered with thiamine chloride.

Thiamine is unstable in neutral and alkaline media. Ultra-violet light is destructive. The vitamin is decomposed by sulfites which are formed in sulfuring of fruits preparatory to drying. Its response to the presence of various salts differs widely with changes in pH and temperature; phosphates are more protective than acetates. Thiamine occurs naturally in the free form and as pyrophosphate or cocarboxylase. In carboxylase activity both magnesium and manganese have a stimulating rôle.

Absorption and Storage.—Thiamine generally is thought to be readily absorbed from foodstuffs by the normal gastro-intestinal tract but, like the utilization of carotene, there is some doubt on the subject. (Refer to Sources.) Certainly older persons absorb the vitamin less efficiently. It is important that ample hydrochloric acid be present in the stomach to assure absorption later. Exposure to duodenal alkalinity may be destructive. Since vitamin B_1 is not as effectively stored in the body as vitamin A, its reserves are much more quickly exhausted, that is, in a matter of days for some tissues, a few weeks for others, but slowly for heart muscle. According to Cowgill the main storage depots are the liver, heart, and kidneys. The proportionate distribution is given by Brodie and MacLeod (1935) as: liver 10, heart 9, kidney 5, voluntary muscle 1, brain 0.33; blood, spleen and lungs traces. In terms of concentration, the heart muscle has been reported as highest with brain, kidney, liver and skeletal muscles next in order (citations by Bicknell, 1947). It is necessary that the daily diet be adequate in its thiamine content since the reserves are not sufficient to compensate for dietary deficiency for more than a few days.

Physiologic Action and Deficiency Effects.—Thiamine is a necessary catalyst for oxidation and decarboxylation of pyruvic acid (refer to p. 35). In its absence carbohydrate oxidation and utilization do not proceed normally and there is accumulation of this acid. Deficiency primarily affects the nervous system. The resultant neuritis

is observed in beri-beri, alcoholism, pellagra, pregnancy, and in surgery where patients must subsist on glucose infusions.

Chronic low-grade deficiency is more obscure in its manifestations, but is now generally recognized to be of considerable clinical importance. The picture of an individual suffering from such a deficiency may include a general depression of neuromuscular tone and vigor; digestive disturbances which may take the form of subnormal appetite or digestive capacity, gastric atony, constipation, or more serious conditions, such as ulcer and colitis; lowered resistance to infections; and, perhaps less frequently, anemia and neuritis. Williams, Mason and Wilder (1940) placed 4 physically healthy American young women on a diet practically free of thiamine for twenty-one weeks. They did not develop the severe neuritis nor swelling characteristic of beri-beri; their symptoms would probably have been diagnosed as neurasthenia or chronic nervous exhaustion had the diet (polished rice, tapioca, cornstarch, sugar, white bread, butter, cottage and American cream cheese, egg-white, cocoa, tea, and white raisins) been unknown.

It is noteworthy that these subclinical conditions found in temperate climates have not been observed (Meyers, 1941) in the Netherlands East Indies, which figured so prominently in the history of beri-beri, although the diet is often subminimal by accepted standards. Beri-beri develops if deficiency is marked, otherwise symptoms are absent. Apparently adaptation to a long-standing, low vitamin B intake is possible in the tropics.

Similarly, under the food restrictions of war, beri-beri may not manifest itself in generally mal-nourished individuals but will appear when the caloric intake is suddenly raised through use of highly processed, relief foods, as white flour and sugar. Production of deficiency effects in some individuals is achieved easily, in others with difficulty. Not only must the question of adjustment to low intake be considered, but also the possibility of synthesis in the human gastro-intestinal tract.

There would seem to be some relationship between the thyroid gland and thiamine function, each increasing the need for the other.

Some factor in the liver, presumably a member of the B-complex and possibly thiamine, controls certain endocrine functions by inactivating estrogen.

Since thiamine is essential to normal transmission of peripheral nerve impulses, its relation to acetylcholine has been investigated. It is probable that the active agent is the acetyl ester of thiamine, as is the case with choline, both esters causing smooth muscle to contract.

Clinical Estimation of Deficiency. Attempts have been made to estimate adequacy of intake by means of the urinary output. When the diet contains about 1 mg. of thiamine, elimination of approximately one-tenth of this may be expected. With double the intake, 0.5 mg. may appear in the urine after a 12-hour fast or test "load"

dose. The vitamin is excreted largely in free form, only a small percentage being cocarboxylase whereas in the blood the latter predominates.

Requirement.—The normal requirement of thiamine appears to be proportional to the total metabolism or total food intake rather than to body weight. Thus, the child requires more in proportion to its size than the adult. Vigorous physical activity or overfeeding increases the thiamine requirement. It is also affected by the relationship between fat and non-fat calories in the diet, increase in the proportion of fat decreasing the need of thiamine to some extent. Alcohol intensifies the body's demand for vitamin B_1. Infections, fevers and other processes which stimulate oxidation correspondingly increase the vitamin requirement. With rising environmental temperatures the requirement of thiamine falls if the individual slows down correspondingly. Otherwise, extra provision of the vitamin appears to be beneficial.

Cowgill (1935) has been the pioneer in expressing mathematically the relation between caloric intake, body weight and thiamine requirement. His revised formula is:

$$\text{Thiamine need in I.U.} = 0.00426 \times \text{body weight (Kg.)} \times \text{caloric intake}$$

This formula determines minimal intake only.

Williams and Spies (1938) calculate the thiamine requirement on the basis of the non-fat calories of the diet. When the quotient *thiamine (I.U.): non-fat calories* is less than 0.3, the diet is likely to produce signs of thiamine deficiency.

The requirement for infants is given (p. 14) as 0.4 mg. daily with children receiving about 0.5 mg. per thousand calories. The adult level varies with activity from 1.1 to 1.8 mg. There is some evidence that even sedentary adults feel better and are more alert on 2 mg. daily intake. The official allowance for pregnancy is 1.5 mg. although clinicians often prefer 2 to 5 mg. per day.

Thiamine Shortage on Ordinary Diets.—Previously it was believed that sufficient thiamine was provided by the average good American dietary but the tide of opinion has turned. It is now accepted that large numbers of people subsist on diets well below a desirable level of thiamine intake and not much above that required to prevent outspoken beri-beri. The lack of specific and recognizable signs of B_1 deficiency, apart from beri-beri, is probably responsible for failure to recognize the prevalence of this dietary defect, but the frequency with which evident improvement in health follows a change to a higher thiamine intake affords additional proof of suboptimal levels in ordinary diets.

Jolliffe (testimony before Administrator of the Federal Security Agency, Wash., D. C., 1940) attributes this deficiency to the diminished use of flour products, the declining vitamin content of modern flours, and to the tremendous increase in dietary sugar. In colonial times the average consumption of sugar was probably around 5 pounds per year or about 25 calories per day. It is now

close to 112 pounds per year, which amounts to 600 or 700 calories per day. Since this sugar is devoid of minerals and vitamins, it is necessary for these nutritive factors to be supplied otherwise. Jolliffe has also stated that the American diet is further significantly diminished by the average consumption of alcohol.

The problem is solved for those willing to eat whole wheat bread and otherwise conserve thiamine sources. Since the vast majority insist on white flour and bread, enrichment of these products is being undertaken by millers and bakers of their own volition or under state regulation. Flour was first enriched with recommended amounts of thiamine, nicotinic acid and iron. Addition of non-fat milk solids augments the riboflavin, calcium, phosphorus and protein content of the finished bread. Effort is directed to provide the public with white bread roughly equivalent to the whole wheat product insofar as the chief B-vitamins are concerned and to improve the nutritive value of bread with dried milk.

Sources. Three micrograms of thiamine hydrochloride constitute an International Unit; 1 mg. of this vitamin is equivalent to 333 I.U. It is noteworthy that there are no outstanding sources of thiamine among common foods. Whole grain products, if used in sufficient quantities, would insure an adequate supply of this factor, but it is hardly possible to obtain enough from this source under modern conditions of food consumption. It should be repeatedly emphasized that natural plant sources contain both the carbohydrate fuel and the thiamine catalyst necessary for its complete oxidation. Processing of the food too often leaves the carbohydrate without the attendant means of utilizing it to the fullest extent.

It has been shown by Aughey and Daniel (1940) that on "a serving basis baked potatoes, including the skin, rank higher in thiamine than cooked whole wheat or oat cereals. Even boiled potatoes, spinach, and carrots may be classed as furnishing amounts of thiamine per serving comparable to those supplied by these cooked cereals. One slice of an all-whole-wheat bread also contains approximately the same quantity of thiamine as one serving of these vegetable and cereal foods." "The whole-grain cereals and dried legumes included in every list of thiamine-rich foods furnish less of this vitamin than is generally supposed" since they are not consumed in the dry state. "Navy beans, taking up less water during cooking, furnish proportionately more thiamine per serving than the cereals."

Cane sugar molasses is another product capable of furnishing an appreciable amount of thiamine when consumed freely, provided it has been processed so as to retain the vitamin. Treatment with sulfur dioxide, of course, is destructive.

Although fruits and vegetables are hardly notable for their thiamine content, they contain sufficient to warrant consideration when these foods are prominent in the dietary.

The liberal use of potatoes, legumes, pork products, liver, nuts,

whole grain cereals, milk, and egg-yolk should provide an adequate thiamine intake. It is to be noted that such a diet necessarily furnishes a high-carbohydrate intake. When such is contraindicated, supplementary sources of thiamine are necessary, the best of which are yeast and wheat-germ. The ordinary amounts taken are ½ to 1 ounce daily of brewer's yeast powder or wheat-germ. Tomato or prune juice has proved to be a satisfactory vehicle for the yeast.

When live bakers' yeast is eaten, not only its thiamine but other thiamine simultaneously consumed fails to be absorbed. Live yeast riboflavin also is not absorbed but that in other foods or in pure form is available for human use. It appears that yeast cells actively take up thiamine from their environment (Garber *et al.*, 1949).

Since thiamine is absorbed relatively poorly in the human intestinal tract, there is an economic limit to oral supplementation. According to Friedemann (1948) the daily total is about 5 mg. It is to be expected that only 1 mg. of the vitamin will be absorbed per meal in addition to that already in the food.

When the body reserves are seriously depleted, as in beri-beri, doses as large as 20 to 50 mg. daily may be used by intramuscular or intravenous injection, but once the reserves are built up it is doubtful whether doses larger than 10 mg. daily have any advantage since the excess is excreted promptly. Thiamine may be added to the daily diet to ensure a high-vitamin intake in fevers and infections and when restricted therapeutic diets prevent the use of high-thiamine foods, but in general the crude concentrates of the vitamin-B complex are preferable for supplements in such conditions.

Good Sources of Thiamine.

Dried brewer's yeast*	Egg-yolk	Pork, lean
Wheat-germ*	Legumes	Rice, brown
Bread, whole wheat	Nuts	Wheat bran
Corn, cornmeal	Organ meats	Whole-grain cereals

* Outstanding.

RIBOFLAVIN.

Chemical Behavior.—Riboflavin is an orange-yellow crystalline pigment, $C_{17}H_{20}N_4O_6$, somewhat soluble in water and dilute alcohol. It occurs both free and as a phosphate, in which form it enters into combination with a specific protein to constitute the yellow respiratory enzyme of Warburg. The separation of this ferment by dialysis into a protein and a flavin destroys its enzyme characteristics but does not inhibit vitamin activity. The flavins are widely distributed in the plant and animal kingdoms.

In solutions, riboflavin exhibits an intense yellow-green fluorescence (maximum at pH 6 to 7). It is not oxidized by exposure to air but is inactivated by light, particularly by ultra-violet irradiation. This vitamin is sensitive to alkaline reaction but heat stable in highly acid media.

Absorption and Storage. Being water-soluble, riboflavin is readily absorbed from the gastro-intestinal tract unless abnormal function exists. Gastric acid appears to be necessary for proper absorption. Flavin phosphoric acid is formed in the intestinal wall. If phosphorylation fails at this site, it can be accomplished in other tissues. Increased liberality of intake results in measurably augmented concentrations of this vitamin in body tissues generally (Carlsson and Sherman, 1939) but capacity for storage is limited. The liver is the chief depot with the kidneys and heart muscle next in order. Emmerie (1937) cited by Hogan (1938) reports that excretion exceeds ingestion on low diets and lags behind on a high intake. Processes involving both storage and tissue depletion do not appear to be rapid. The stored vitamin may not be used for current needs when exogenous riboflavin fails nor may the tissues promptly absorb dietary riboflavin. Under stress, it would appear that the flavin is conserved more effectively by the body than is thiamine.

Factors controlling storage are not well understood but adequate protein intake is needed to assure optimum riboflavin retention in the tissues.

Physiologic Action and Deficiency Effects.—Riboflavin is a component of essential intracellular respiratory enzymes involved in the transfer of hydrogen and oxygen from one metabolite to another (refer to p. 288). Deficiency, therefore, may have widespread effects. According to Sherman and Campbell (1939) riboflavin shares with calcium and vitamin A the credit for the chemical improvement in an already normal condition of nutrition.

Because of its close association with other factors of the B complex, notably nicotinic acid, it has been difficult to determine the clinical picture of pure riboflavin deficiency in humans. Deficiency of the flavin is responsible for some of the manifestations of the pellagra syndrome. Ariboflavinosis is characterized by a specific type of glossitis in which the tongue is magenta colored and by cheilosis in which there is fissuring in the angles of the mouth. Scaly changes occur in the skin of the nose and forehead.

Lack of riboflavin also results in itching, burning and excessive dryness of the eyes, photophobia, granulation and extreme redness of the conjunctiva, particularly of the lower lids (Spies, Hightower, and Hubbard, 1940). Vascularization of the cornea is common and also the formation of corneal opacities. Pock-Steen (1939) found that 1 mg. doses of the flavin cured the "twilight blindness" seen in patients with sprue. Larger amounts are needed to relieve the pain and lacrimation in keratitis and to reverse the corneal changes.

Experimentally produced riboflavin deficiency may demonstrate no change until the animal collapses and dies within a few minutes or after twenty-four to forty-eight hours of coma. Fatty infiltration of the liver is a common finding and, incidentally, has been observed also in cases of pellagra coming to autopsy.

Deficiency symptoms are seen clinically in the presence of markedly inadequate diets as in pellagra, chronic alcoholism, and poorly-balanced, long-continued therapeutic diets. Not infrequently persons of professional standing exhibit definite riboflavin deficiency. There is increasing evidence that ariboflavinosis is the most widely distributed of the vitamin deficiencies.

Neurological manifestations of ariboflavinosis include "burning feet," exaggerated knee jerks, muscular weakness, lack of normal sensations in the legs, trembling, dizziness, and mental sluggishness.

Clinical Estimation of Deficiency. So far saturation tests have not proved clinically valuable since excretion is too variable. The daily output, however, is somewhat related to the intake and can be used as an aid in determining the presence of riboflavin deficiency.

Requirement. According to Elvehjem (1941) there may be a certain degree of riboflavin synthesis in the intestinal tract under normal conditions. If there are sudden changes in the intestinal flora, the entire riboflavin requirement may have to be supplied in the diet. When the fat content of the diet is increased, there is a demand for more riboflavin in the food.

Further confirmation of riboflavin synthesis in the human intestinal tract has resulted in lowering of accepted requirements (p. 14). Starting with the infant at 0.6 mg. per day, the amount is increased gradually to 1.8 mg. by the tenth year. Children from 13 to 15 years of age are allowed 2 mg. Girls thereafter are estimated to need 1.8 mg. until adulthood when 1.5 mg. is deemed sufficient except for pregnancy and lactation with increase to 2.5 and 3 mg. respectively. Older boys are allowed 2.5 mg. until twenty years of age when 1.8 mg. is then regarded as sufficient. In the 1948 revised recommendations, the riboflavin allowance was based on body weight rather than on caloric levels.

Sources. One milligram of riboflavin is equivalent to about 333 Sherman-Bourquin rat-growth units; 1 Sherman-Bourquin unit (S.B.U.) equals 3 μg. of riboflavin according to the 1939 standards of the Council of Foods of the American Medical Association. The older value was placed at 0.0025 mg. or 2.5 μg.

Yeast and liver are the outstanding sources of riboflavin. Liver has approximately ten times the riboflavin content of muscle. According to György (1935) fish muscle is poor in this vitamin. Meat and meat products are an important source of riboflavin, glandular organs being particularly rich. From the data of Michelsen, Waisman, and Elvehjem (1939) the minimum daily requirement of this vitamin can be met by 12 to 15 grams of dry liver or 50 to 60 grams of the fresh material, the food being fried before ingestion. Approximately 450 grams of fresh fried pork loin would be needed to provide a similar amount of riboflavin.

The abundance of good sources of riboflavin makes it evident that deficiency is not likely to occur in normal well-varied diets.

The use of green vegetables, meat, eggs, and milk products is sufficient to insure an adequate intake.

For the treatment of acute and severe deficiencies, purified preparations of riboflavin are available for oral or parenteral use. Six milligrams daily is ample for subsidence of symptoms in a few days (Sebrell). The average case of ariboflavinosis responds to 3-5 mg. daily taken orally. Lack of ready solubility hampers administration both orally and intravenously. If there is any doubt as to intestinal absorption, the dose needs to be tripled.

Good Sources of Riboflavin.

Liver*	Eggs, whole	Peanuts
Dried yeast*	Leafy vegetables	Pecans
Almonds	Meats, lean	Prunes
Bran	Meats, organ	Salmon
Buttermilk	Milk, skim	Wheat germ
Cheese, Cheddar	Oysters	Whey

* Outstanding.

NICOTINIC ACID.

Chemical Behavior.—Nicotinic acid or 2-pyridine carboxylic acid, $C_5H_4N.COOH$, crystallizes as colorless needles which are soluble in alcohol and ether but only slightly so in water. The acid is readily soluble in alkali carbonate solutions. The amide is very much more soluble in water than the acid. It is fairly resistant to heat.

Nicotinamide is the reactive portion of Coenzymes I and II which function in cellular oxidation. Sydenstricker (1941) has outlined the probable changes which occur in the combustion of glucose: "After the phosphorylation of hexose to hexose diphosphate and subsequent cleavage to triose phosphate, the pyridine nucleotides oxidize the triose phosphate, losing oxygen, which is replaced by oxidation by flavoprotein. Flavoprotein is in turn reoxidized by molecular oxygen, possibly derived from cellular heme. In the later stages of the utilization of dextrose reduced coenzyme I acts as a hydrogen donator in the conversion of pyruvic acid to lactic acid".

The rôle played by nicotinamide in biologic oxidations is well established. Since the essential pyridine nucleus is not formed in the body, it must be supplied in the diet. The various coöperating enzymes in tissue oxidation include co-carboxylase (*thiamine* pyrophosphate), the yellow ferment (*riboflavin* phosphate + protein) and co-dehydrogenase I which consists of *nicotinamide*, adenylic acid (adenine-ribose phosphate), ribose and phosphoric acid. The pyridine nature of vitamin B_6 would suggest that it functions similarly.

Absorption and Storage.—Nicotinic acid occurs in food largely as coenzymes which apparently offer no problem insofar as normal ab-

sorption is concerned. In critical deficiency, food sources become inadequate and the acid or its amide must be administered in relatively large doses.

Storage occurs particularly in the liver. Many months are required to deplete the body's supply of nicotinic acid. Presumably this is in part due to synthesis in the intestinal tract.

Physiologic Action and Deficiency Effects.—Many of the symptoms of pellagra can be attributed to lack of nicotinamide but others are undoubtedly due to deficiency of thiamine, riboflavin, and possibly pyridoxine. Nutritional failure of these three vitamins has been reported to cause disintegration of personality, including breakdown of morale (Frostig and Spies, 1940). The spectacular effects, which have been observed after thiamine, riboflavin and nicotinic acid therapy, may well be interpreted as representing enhanced ability to carry on oxidative processes in the tissues with a consequent sense of well-being and vitality.

Sydenstricker emphasizes the fact that "the significance of the composition of diets is still not appreciated . . . The idea is still prevalent that dietary inadequacy implies semistarvation; it is extremely difficult to implant the fact that a diet may have excellent caloric value but produce severe nicotinic acid deficiency because it necessitates excessive derivation of energy from carbohydrate. The adequacy of the vitamin intake is directly related to the proportion of calories derived from carbohydrate and to the metabolic demands of the body".

Since it is required for intracellular respiration, lack of nicotinic acid leads to varied and startling manifestations depending on the tissue affected and the acuteness of the deficiency. These changes are too extensive for discussion here.

Clinical Estimation of Deficiency. The kidney excretes nicotinic acid, conjugates thereof, and derivatives which are a matter of controversy. Consequently, excretory values under test conditions are subject to dispute.

Requirement. The normal need for nicotinic acid is estimated at about half that accepted in 1940. Official recommendations (p. 14) are ten times those for thiamine, ranging from 4 mg. for the infant to 18 mg. for a man doing heavy work. The requirement is increased by infection, hyperthyroidism, pregnancy, lactation, elevation of temperature, and physical exertion.

The requirement for nicotinic acid is by no means simple but complicated by other factors such as the amino acid intake, the kind of carbohydrate, the level of dietary fat, and possibly availability of minerals. A high fat intake decreases the need for nicotinic acid. Tryptophan is the amino acid of importance.

Sources.—The nicotinic acid content of foods is no safe criterion as to their capacity for producing or relieving deficiency of this vitamin since tryptophan also is corrective. Corn, for example, can be enriched with nicotinic acid to improve it or tryptophan-rich

foods as meat, milk and eggs can be fed with the corn to prevent pellagra.

Good Sources of Nicotinic Acid.

Fish	Meat extracts	Peanuts
Leafy, green vegetables	Molasses	Poultry
Lean meats	Mushrooms	Whole grain products
Liver	Organ meats	Yeast

PYRIDOXINE.

Chemical Behavior.—Vitamin B_6 was isolated in pure form by Lepkovsky (1938) and its chemical constitution determined, $C_8H_{11}O_3N$. It is relatively heat-stable, even in alkaline solution, and is only partly soluble in water in its natural state. It is rendered very soluble in water by autolysis of the complex of which it is a part. Vitamin B_6 exhibits basic properties and has been named pyridoxine. This substance is destroyed by long exposure to light.

An aqueous solution of vitamin B_6 hydrochloride reaches 3.2 on the pH scale. The white platelets are soluble to the extent of 1 gram in about 4.5 cc. of water or 90 cc. of ethyl alcohol. The hydrochloride is stable to heat, strong acids, and alkali.

Physiologic Action and Deficiency Effects.—Vitamin B_6 exists in three forms: pyridoxine, pyridoxal, and pyridoxamine. Pyridoxine is converted into the other two but the reverse action apparently does not occur. Possibly pyridoxal phosphate is the most important form. All three are oxidized in the body to give 4-pyridoxic acid, chief excretory product. Strangely enough, the aldehyde and amine forms are less active than pyridoxine in promoting growth in B_6 deficient animals when the vitamin is fed with the ration but are equally potent when given by injection or fed separately from the food. Refer also to p. 359 and p. 362.

It is possible that pyridoxine is synthesized in the intestines. Toxic effects from overdosage must be guarded against.

According to Spies, Bean and Ashe (1939) pyridoxine is essential in human nutrition as judged by its preventive and curative effect on certain parts of the pellagra syndrome. Four patients under nicotinic acid, thiamine chloride, and riboflavin therapy complained of residual symptoms which included extreme nervousness, insomnia, irritability, abdominal pains, weakness, and difficulty in walking. The administration of 50 mg. of pure synthetic vitamin B_6 in sterile salt solution brought immediate and spectacular relief; within twenty-four hours all symptoms had disappeared. It would thus appear that pyridoxine is involved in muscle metabolism.

Both Spies and Jolliffe (1940) have been successful in the treatment of paralysis agitans with pyridoxine. Jolliffe employed an intravenous dose of 100 mg. daily and obtained spectacular return of expression to the face, lessening of the rigidities and increased strength of movement. Whether or not the whole of the B complex is necessary for sustained results has not yet been established.

Although pyridoxine has been called the anti-acrodynia factor,

it is not the sole agent in prevention of this particular dermatitis. Certain essential fatty acids are also required; possibly vitamin B_6 is concerned with their utilization.

Undoubtedly pyridoxine is intimately connected with protein metabolism, presumably functioning as a coenzyme in transfer of amino groups. It is involved particularly in tryptophan metabolism which relates it, then, to nicotinic acid.

Its rôle in anemia will be mentioned later (p. 297). Preliminary work suggests the vitamin may stimulate increase in white blood cells in leucopenia (Cantor and Scott, 1944).

Pyridoxine insufficiency has been suggested as a cause of nausea and vomiting in pregnancy.

Sources and Requirement.—Information regarding the quantity of pyridoxine present in foods has been derived from two sources: (1) earlier work involving biologic tests for the anti-acrodynic potency, and (2) chemical determination. By the biologic method, which undoubtedly includes more than the effect of B_6, fruits and vegetables are poor in this factor; fish and meat fair; seeds, legumes, and cereals relatively rich; egg-yolk and many of the vegetable oils (linseed, peanut, rice, soy bean, cottonseed, corn, and wheat-germ) conspicuously high. By the chemical method, dried brewer's yeast is outstanding in its content of pyridoxine. By this same procedure corn does not rate as high as previously thought.

Crude cane molasses is a good source of B_6 and also contains some riboflavin; beet molasses is practically devoid of both these factors (György, 1937). Cow's milk is equally potent in riboflavin and vitamin B_6; human milk possesses the same potency for B_6 as cow's milk, but only one-third the amount of riboflavin (György, 1936). Butter, lard and beef fat contain this vitamin.

The pyridoxine content of meat has been investigated by Henderson, Waisman, and Elvehjem (1941). Muscle tissue is a better source than liver (the reverse is true for riboflavin, pantothenic acid and nicotinic acid). This same school found that pork muscle was superior to liver in thiamine content. Drying does not affect the pyridoxine content of meat, but "tenderizing" leads to as much as 60 per cent loss. Frying is the least detrimental form of cooking. Stewing and roasting may result in 50 per cent loss. The loss is attributed to leaching. Similarly, Lantz (1940) has reported considerable loss of pyridoxine in the soaking water used for pinto beans. Refer to p. 344 for table of food values.

Elvehjem has estimated that the human requirement for pyridoxine is about 2 mg. per day. Natural foods supplying adequate thiamine, riboflavin, and nicotinic acid are expected to provide enough of the remaining B vitamins.

Good Sources of Pyridoxine

Egg-yolk	Milk
Fish	Meat
Legumes	Whole grain products
Liver	Yeast

PANTOTHENIC ACID.

Chemical Properties.—The eighth vitamin to be synthesized was designated pantothenic acid (Gr. "from everywhere") by R. J. Williams (1933) since it appears to be of fundamental nutritional importance. Later (1941) Williams suggested that this name be shortened for popular use to *pantothen*. It is available as its calcium salt which is a white crystalline powder, $(C_8H_{14}O_5N)_2Ca$. Pantothenic acid, a yellow viscous fluid, is soluble in water and shows both acid and basic properties. It is fairly stable to moist heat at a neutral reaction but not in an alkaline medium. It is destroyed by prolonged dry heat. It occurs largely in a bound form which is readily hydrolyzed enzymatically into two components.

Physiological Action and Deficiency Effects.—Pearson (1941) has reported whole human blood to contain about 20 μg. per cent, with plasma and cells at 17 and 24 μg. respectively. Decreased concentration has been observed in patients known to be deficient in other members of the B group (Stanbery, Snell, and Spies, 1940).

Intravenous injection of as much as 100 mg. of calcium or sodium pantothenate into human beings has been made without untoward reactions. Following injections of pantothenic acid there has been noted an associated rise in blood riboflavin. Likewise, injection of riboflavin has induced an increase in the blood level of pantothenic acid. This is taken as evidence of the essential character of this acid in human nutrition. Presumably it is related to riboflavin in function. (Spies *et al.*, 1940.)

Although proof of human deficiency is still scanty, this vitamin is well established as an important growth factor. It is found in all animal tissues and is believed essential to all forms of life. Many scattered deficiency effects have been noted many of which are closely related to other members of the B-Complex. Oxidation of pyruvic acid appears to need pantothenate and biotin as well as thiamine. Connection with riboflavin has already been mentioned. Derangements in carbohydrate and fat metabolism follow deprivation in animal experiments. Some of the findings suggest that lack of panthenate upsets inositol function.

In line with its known rôle as a stimulant of respiration in plant tissues, it has a favorable effect upon certain intestinal bacteria which are thought to synthesize B-vitamins. Indirectly, then, it could produce deficiency symptoms of other vitamins. Hemorrhage of the adrenal glands is one of the evidences of pantothenic acid deficit, but it does not respond to this vitamin but to inositol. In this connection mention should be made of human cases observed by Supplee (1941) with fatigue, fainting spells, breathlessness, and disturbed pulse rate—symptoms suggesting failure of the adrenal glands possibly attributable to lack of pantothenic acid which produced inositol deficiency.

Although graying of fur can be produced in suitable animals by dietary means and corrected similarly, the problem of human gray

hair has not been resolved so simply. Claims that human hair can be darkened by use of pantothenate, para-aminobenzoic acid, and yeast are generally not accepted.

Conditions associated with pantothenate deficiency also include fatty infiltration of the liver, hemorrhagic conditions of the kidneys, and abnormal behavior of the gastrointestinal tract. This involves other members of the B-complex, especially inositol, biotin and folic acid.

The question has been raised as to the possibility that pantothenate may be a limiting factor in longevity.

Sources and Requirement. Pantothenic acid is widely distributed in foods and is universally found in all animal tissues, including man. The highest concentration of pantothenic acid is found in the liver and kidneys, then in order the heart, spleen, brain, pancreas, tongue, lungs. Muscle tissue has the lowest concentration. Waisman, Michelsen, and Elvehjem (1939) discovered that stewing decreased the potency of kidneys, heart, and spleen by one-third. Frying did not destroy the pantothenic acid in liver, in fact, the cooking seemed to improve the growth stimulating factor in this organ. However, losses in cooking may amount to 60 to 100 per cent. Half the pantothenic acid is lost in the milling of wheat, the bran being particularly rich. Nevertheless, white bread compares very favorably with the whole wheat product. Refer to p. 344 for table of food values.

The human requirement is assumed to be about 5 mg. per day.

Good Sources of Pantothenic Acid.

Broccoli	Legumes	Poultry
Cauliflower	Liver	Taro
Cereals	Milk, skim	Walnuts
Egg-yolk	Oysters	Yeast
Fish	Peanuts	Zucchini

BIOTIN.

Chemical Properties. The naturally occurring organic complex is insoluble both in fat and water. During autolysis of yeast, the water-soluble vitamin is set free. On proteolytic digestion it is released from some substance present in liver. The vitamin possesses acidic properties. It may be autoclaved at 200° C. for one to two hours without deleterious effect. Although generally regarded as resistant to boiling and treatment with acids or alkali, biotin is destroyed under these conditions. The vitamin occurs in various natural combinations often requiring vigorous attack with sodium hydroxide or sulfuric acid in high concentration. In the process biotin may indeed be released only to be destroyed. Presumably the biotin must be freed during digestion if it is to be available for the body. It has yet to be learned what constitutes available biotin.

The erstwhile vitamin H has been obtained as crystalline biotin (Du Vigneaud, 1941), $C_{10}H_{16}O_3N_2S$, and is commercially available

as its crystalline monomethyl ester or free acid in solution. (See p. 351.) Synthesis was achieved by Harris *et al.* in 1943.

Physiological Action and Deficiency Effects. Biotin is a potent growth stimulant for living organisms. Minute amounts suffice. Its numerous functions are at present obscured by complex interrelationships among the B-vitamins.

Oxalacetate and aspartate can partially replace the biotin requirement for some bacteria (Landy, 1947). It is known that biotin plays a rôle in converting pyruvic acid to oxalacetic, that is, it is concerned with CO_2 fixation. (Manganese enters into this reaction too.) Additionally, biotin activates removal of the NH_2 group from aspartic acid, serine and threonine (see p. 291).

Another function of biotin can be met by providing oleic acid. In some organisms good growth can be obtained without biotin so long as oleic and aspartic acids are adequate.

Excess biotin leads to fatty infiltration of the liver which is corrected by inositol. This type of fatty liver responds also to lipocaic.

Biotin can be rendered unavailable by combination with a glycoprotein in *raw* egg-white, avidalbumin or avidin. This complex is not toxic in itself (except to those organisms which find it bacteriolytic); the well-known "egg-white injury" is due to depriving the animal of necessary biotin. This vitamin is synthesized in the human intestinal tract and it takes a very considerable amount of raw egg-white to produce clinical symptoms, chief of which is a skin malady differing from that associated with lack of nicotinic acid, pantothenate, pyridoxine or riboflavin. Raw egg-white also binds iron, rendering this element unavailable (Schade and Caroline, 1944).

Examining natural foodstuffs for biotin in 1944, chemists detected the presence of a new B factor; in August 1949 its isolation was reported (Wright) and the name *biocytin* attached to it.

Sources. The main sources of biotin are liver, kidney, yeast, egg-yolk, and to a lesser extent cow's milk. Breast milk possesses only slight potency. Cane molasses is rich in this vitamin. Since biotin is ubiquitous and since human synthesis is regarded as adequate, no requirement is given. However, it should be noted that drugs given by mouth for infections either in the body or intestinal tract may effectively inhibit activity of those organisms responsible for synthesis of this and other members of the B-family, resulting in unexpected and probably unrecognized deficiencies.

CHOLINE.

The amine, trimethyl-ethanol-ammonium hydroxide, hitherto existed as an impurity in vitamin B complex concentrates but is now provisionally included among the water-soluble vitamins. It is a colorless, viscous liquid. In the absence of choline, "fatty livers" develop and hemorrhagic degeneration occurs in the kidneys. It is involved in the metabolism of the sulfur-containing amino acids. A high methionine intake tends to decrease the choline requirement

whereas a high cystine intake increases the need for choline (Elvehjem, 1941). Thus, it is seen to affect fat and protein metabolism directly. This growth factor is indirectly concerned with carbohydrate metabolism.

The chemical characteristic shared by methionine and choline is a labile methyl group, essential for metabolic processes. Choline additionally is required for production of acetylcholine which functions in transmission of peripheral nerve impulses, and for elaboration of phospholipids without which fat metabolism bogs down. Choline does not function properly unless pyridoxine and essential fatty acids are available.

Sources and Requirement.—Choline exists largely in bound form, as lecithin or lecithoproteins. Good sources include egg-yolk, glandular organs (as brain, kidney, liver, and pancreas), soybeans, wheat germ and yeast. Less is found in such items as bacon and butter fat.

This vitamin is available for use as choline chloride (see p. 352).

The human requirement for choline has been assumed not to exceed 500 mg. per day. The average diet contains 250 to 600 mg. in the daily ration.

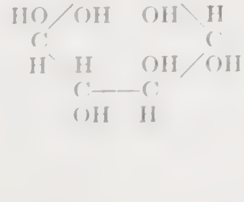
PARA-AMINOBENZOIC ACID.

It has already been established that this acid is essential for the lower forms of life. In higher animals it has achieved fame as the "anti-gray hair vitamin." It appears to be involved in tyrosine and melanin metabolism. Its clinical use has been disappointing and prolonged ingesting of this vitamin is not recommended although it has been used without apparent ill effect in single 4-gram doses and in 100-mg. doses twice daily for two months. This vitamin is found in yeast, liver, and molasses (Ansbacher and Martin, 1941). It possesses the unique property of antagonizing the bacteriostatic action of sulfanilamide (Woods, 1940).

This vitamin is attracting considerable attention as a drug for the treatment of typhus and Rocky Mountain spotted fever (1944-49). These rickettsial diseases do not respond to sulfonamide treatment.

INOSITOL.

Inositol is a sweet crystalline substance, very stable, which is widely distributed in plants and animals. The biologically active form of this cyclic hexahydric alcohol, $C_6H_6(OH)_6$, is optically inactive and designated as i- or meso-inositol with the formula:



Inositol has been called "muscle sugar." It is found free in plants and animals, and in plants as phytins (refer to p. 235). Inositol is found as a water-soluble, non-dialyzable complex in many animal tissues, as liver and heart. In soybeans and elsewhere it is found as lipositol which is composed of inositol monophosphate, galactose, ethanolamine, tartaric, oleic and saturated fatty acids.

Its rôle in fat metabolism still is somewhat obscure. It is capable of mobilizing cholesterol from blood vessel walls and thus is of great interest in arteriosclerosis, especially as seen in diabetics.

Dietary factors which cause different types of "fatty liver" include:

Relative or Absolute Excess of	*Relative or Absolute Deficiency of*
Biotin	Choline
Cholesterol	Essential fatty acids
Cystine	Methionine
Nicotinic acid	Pantothenic acid
Vitamins B_1 and B_2	Pyridoxine

Deficiency of pyridoxine and excess of biotin produce fatty livers which respond to inositol, presumably increasing the demand for this agent.

Like pyridoxine, pantothenate, and *p*-aminobenzoic acid, inositol seems to be involved in maintenance of normal hair or fur in animals. Inositol may improve the action of tocopherol in treating progressive muscular dystrophy (Milhorat and Bartels, 1945).

Sources and Requirement. The daily intake of inositol has been estimated at 1 gram per 2500 Cal. (R. J. Williams). Soybean lecithin contains crude inositol to the extent of 5 to 10 per cent. Defatted wheat germ shows about 0.25 per cent concentration. Possibly inositol is not needed directly by animals but by their intestinal flora for the synthesis of vitamins. Sources include eggs, meats, milk, nuts, fruits, vegetables, whole grains and yeast. Cooking may result in considerable inactivation.

FOLIC ACID.

The term, folic acid, has been applied to a group of related substances found in green leaves. The synthetic product is known as pteroylglutamic acid (PGA). For other terms covering folic acid activity and for its chemical structure, refer to p. 355.

Folic acid is yellow, crystalline, and sparingly soluble in water. It occurs both free and conjugated. It is a necessary growth factor for bacteria and a drug for treating experimental and human anemias.

Folic acid, pyridoxine and ascorbic acid are implicated in the metabolism of tyrosine and other phenols. It would appear that pantothenic acid is not well utilized unless folic acid and biotin are

available. This new and least stable member of the B-complex has some important function in maintaining a normal gastro-intestinal tract.

White blood cell destruction (leucopenia and granulocytopenia) as well as anemia may result from taking headache remedies, sulfa drugs, etc. In women this response is likely to appear with the approach or onset of the menstrual flow when a critical situation may be precipitated without warning. A poorly constructed reducing diet may precede this malady. Since folic acid is curative to rats with leucopenia following sulfonamide dosage, it is probable that this or related agents will prove beneficial in human therapy.

Sources and Requirement. Intestinal synthesis under normal conditions is expected to furnish sufficient of this vitamin. Because of indeterminate factors, assays are likely to be for "folic acid" and subject to frequent revision. Such tests reveal that "folic acid" gives the greatest losses due to cooking of all the B-vitamins studied. Since it normally exists in conjugated form, possibly it is "bound" by heat and so escapes laboratory detection. Canned and cooked foods, therefore, at present are rated as very low, even zero.

Findings of Olson *et al.* (1947) show:

Very high "folic acid"—fresh deep green, leafy vegetables; liver
High—fresh green vegetables, cauliflower, kidney
Moderate—beef, veal, dry breakfast cereals prepared from wheat
Low—root vegetables, tomatoes, cucumbers, light green leafy vegetables, bananas, pork, ham, lamb, cheese, milk, dry breakfast cereals from rice or corn.

"Folic acid" diminishes rapidly at room temperature in vegetables but not so under refrigeration or in crushed ice. This factor is also found in yeast, mushrooms, and soybeans. The content of eggs is low to start with and is diminished 20 to 50 per cent in cooking.

VITAMIN B_{12}

A red, crystalline, heat-stable compound obtained from liver and known to be a cobalt complex is at present designated as vitamin B_{12}. Because of its curative properties in pernicious anemia (especially with regard to neurological symptoms) it has been labelled APA for anti-pernicious anemia factor—*the* factor sought for two decades.

Untold numbers of investigators have sought for the factor or factors responsible for the various types of anemia. These range from simple iron deficiency to Addisonian pernicious anemia. Copper and cobalt are essential also in minute amounts; an adequate intake of protein and a sufficiency of calories are necessary for correcting an anemia. The B-complex provides several anti-anemia principles. According to Sebrell (1949) biotin, choline and *p*-aminobenzoic acid have little direct connection with erythropoiesis. Thiamine is not important in this connection either. Riboflavin, pyridoxine and pantothenic acid deprivation have led to anemias in animals but not

in man. In anemia attributed to pantothenate, there is a secondary lack of folic acid. The rôles played by riboflavin and pyridoxine are complicated by inter-relationships with other factors. Anemia in both experimental animal and man is associated with niacin deprivation but this vitamin does not control the anemia in pellagra any more than it does several other symptoms seen in this complex deficiency disease.

In addition to anemias characterized by lack of hemoglobin there is a type which shows a decrease in number and enlargement of circulating red blood cells. The pteroylglutamates (folic acid) are effective therapeutic agents in pernicious anemia, tropical sprue, macrocytic anemia of pregnancy, old age and malnutrition, megaloblastic anemia of infancy, etc. Although folic acid corrects the blood picture in pernicious anemia, it does not control the nerve lesions. Vitamin B_{12} takes care of both phases of the disease. Orally administered thymine is beneficial in macrocytic anemias but less so than folic acid which is thought to synthesize this pyrimidine. Vitamin B_{12} is concerned with synthesis of thymidine, the nucleoside of thymine; thymidine can substitute in part for the vitamin. Xanthopterin, the yellow pigment in butterfly wings and a relative of folic acid, under the action of an oxidase may give vitamin B_{14} which may be still another addition to the pernicious anemia picture.

It is evident that both folic acid and vitamin B_{12} are involved in nucleic acid or purin metabolism. Thymine, folic acid and vitamin B_{12} all lead to increased hemoglobin and red blood cells in the circulation, associated with a rise in reticulocytes which is interpreted as indicating stimulation of the bone marrow where red blood cells originate. Minute amounts of vitamin B_{12} have the effect of larger doses of folic acid and this in turn is far more potent than thymine.

Units.—One microgram of crystalline vitamin B_{12} is equivalent to 1 U.S.P. injectable unit of liver extract and this is equivalent to 11,000 LLD units (see p. 357).

Animal Protein Factor.—An unknown growth factor has been labelled "animal protein factor." Excellent sources are fish meal, liver and milk. Bacteria can synthesize it from hen-house litter. It is possible that this agent and vitamin B_{12} are identical.

Sources.—Vitamin B_{12} has been found in milk powder, beef extract and culture broths of several organisms. It has been isolated in crystalline form from Streptomyces griseus as well as from commercial liver extract (Rickes, 1948).

ASCORBIC ACID (VITAMIN C).

The ability of fresh fruit and vegetables to protect against scurvy is due to the presence of a factor known as vitamin C, now identified as *ascorbic acid*, $C_6H_8O_6$, a carbohydrate derivative. The term *cevitamic acid* has been suggested as a more suitable name, but has not achieved popularity.

Chemical Behavior.—Ascorbic acid is a white crystalline powder, soluble in water and insoluble in oils. When dried, it is stable on exposure to air and daylight at room temperature for years; development of a buff color is not attended by appreciable decomposition (King, 1939). Aqueous solutions, however, are readily oxidized, especially in the presence of flavins or light. An alkaline medium is more destructive than an acid one. The vitamin is inactivated by heat only in the presence of oxygen.

The outstanding chemical characteristic of ascorbic acid is its powerful reducing action. Oxygen combines with it in two stages to form: (1) *dehydro-ascorbic* acid which is easily reduced in the body to the original state and thus is equivalent to active vitamin C; and (2) a more completely oxidized product which is irreversible and inactive. Vitamin C assays, therefore, must determine both the active unoxidized form (ascorbic acid) and the reversibly oxidized one (dehydro-ascorbic acid).

Not all of the various forms of ascorbic acid which have been synthesized (Zilva, 1935) possess antiscorbutic activity. Of the seven structural variants which have been already prepared, *l*-ascorbic acid shows the greatest potency and is the compound indicated when vitamin C or simply ascorbic acid is mentioned. Physiologic activity apparently is associated with the spatial arrangement of the oxygen bridge (refer to p. 351).

Absorption and Storage.—Ascorbic acid is absorbed from the small intestines under normal conditions. Ulceration, diarrhea, lack of gastric acid, etc. interfere with this process even though dosage is high. Intestinal bacteria can destroy vitamin C but ordinarily prefer glucose; thus carbohydrate has a sparing effect on the vitamin. Absorption is definitely better when the vitamin is taken along with food.

Ascorbic acid is widely distributed in the body and there is sufficient storage space available so that the vitamin can be drawn upon for months. In many sections of the earth intake of vitamin C is seasonal. The highest concentrations reached in animal tissue are in the glandular organs, such as adrenals, pituitary and corpus luteum.

Ordinarily little vitamin C is found in the feces. The urinary output depends on the intake once body stores are saturated, except upon overwhelming dosage.

Physiologic Action and Deficiency Effects.—Ascorbic acid is identified as one of the series of intracellular oxidation ferments necessary for the metabolism of food-stuffs by the cell. All actively growing parts of the higher plants are rich in vitamin C. Animal tissues of high metabolic activity have greater concentrations of ascorbic acid than those with a lower metabolism.

Many functional rôles have been assigned to vitamin C. These include maintenance of capillary resistance, coöperation with vitamin D in the formation of normal bone and tooth structures, and

protection against bacterial invasion of the tissues. Vitamin C is concerned with the elaboration of certain intercellular colloids, notably the cementing substances which occur in the matrices of bone, in the capillary wall, in cartilage and dentin.

The classic picture of outstanding vitamin-C deficiency is scurvy, characterized by periosteal hemorrhages about the joints, swollen and bleeding gums, and often anemia. Lesser degrees of inadequacy, when long continued, have been shown to produce a variety of effects in different tissues. In the growing young, defects occur in the development of bone, cartilage and dentin.

Even slight degrees of vitamin-C deficiency tend to weaken the capillaries and predispose to the occurrence of capillary hemorrhages. This has been made the basis of the commonly used capillary resistance test for vitamin-C deficiency, in which the relative intracapillary pressure is increased by the application of a tourniquet to the arm or by applying a suction pump. The occurrence of petechial bleeding in response to this test suggests vitamin-C deficiency, but since other factors may also predispose to such bleeding, it cannot be regarded as specific unless the administration of vitamin C is shown to have a curative effect.

Since the vitamin C content of the endocrine glands is notably high, some functional connection has been sought, such as participation in hormone synthesis. Vitamin C is found wherever there is a high degree of metabolic activity. The vitamin has widespread effects in carbohydrate and protein metabolism but much experimental work is needed to clarify the situation.

The relation of vitamin C to anemia is too involved for discussion here. Presumably B-vitamins are needed too. According to Bergeim and Kerch (1949) reduction of iron occurs in the stomach preparatory to absorption; vitamin C, proteins and protein digestion products participate in the attack upon food iron. It is generally believed that hydrochloric acid in the stomach and vitamin C have a favorable effect upon iron absorption. Administration of the vitamin raises the serum iron content.

Clinical Estimation of Deficiency. Capillary resistance tests are less common than formerly since the determination of blood and urine ascorbic acid concentrations has become routine. Levels as low as 0.2 mg. per cent in the blood plasma are usually required to produce abnormal capillary fragility and then only when such concentrations persist for a considerable period of time. The normal fasting plasma level is 0.7 to 1.4 mg. per cent. The upper limit probably represents the renal threshold. Absorption of ascorbic acid reaches a peak four to six hours after ingestion. The normal adult on an average satisfactory diet excretes 20 to 30 mg. and the normal child 10 to 30 mg. The amount which appears in the urine reflects, as a rule, not only the current intake but also the degree of saturation within the body.

Numerous investigators have devised tests to measure vitamin-C saturation. These are performed by giving test doses ranging from

100 to 1000 mg. by oral, subcutaneous or intravenous routes and determining the amount excreted in fixed time. A saturation test may show depleted reserves if the vitamin-C intake has been below normal for only a few days preceding the test and it may show good storage after only a day or two of high intake; it gives no information as to the adequacy of the customary diet unless this happens to be the test diet. For maintenance of the blood level at or above 1 mg. per cent, it is necessary to ingest at least 100 mg. of the vitamin daily. Blood concentrations of 0.4 to 0.5 mg. represent borderline deficiency.

Requirement. The **International Unit** of vitamin C is equivalent to 0.05 mg. of *l*-ascorbic acid. The Sherman unit is approximately ten times as great. It is customary, however, to express requirements in terms of milligrams rather than in units.

There is general agreement that bare adequacy is in the neighborhood of 20 mg. for infants, 40 mg. for children and 50 to 60 mg. for adults. Since there is every advantage in liberality, at least double these amounts are advisable to provide ample margin against increased individual need and against loss of the vitamin during storage or processing, which makes it difficult to estimate the intake accurately.

Official recommendations (p. 14) allow 30 mg. for the infant and increasing amounts for children up to 100 mg. for 16 year old boys. For men 75 mg. is suggested, and 70 mg. for women with 100-150 mg. being allowed during pregnancy and lactation.

It should be recognized that there are two schools of opinion: (1) those who believe that the low intake of many races is sufficient and that 30 mg. per day is enough, and (2) those who believe that the intake should be pushed to the highest levels possible. In the latter category, Bourne (1949) has suggested that perhaps we need 1 to 2 grams per day so that ascorbic acid will flush out through the skin and kidneys at a high rate.

Hard labor, fevers, infections (particularly tuberculosis and diphtheria), leucemia, hyperthyroidism, malignancy, pregnancy, and lactation are known to make greater demands upon the vitamin-C stores. There is increased need for ascorbic acid during healing of wounds and fractures.

Sources.—Certain observations suggest the possibility of other factors being associated with vitamin C in the common fruit and vegetable sources, although these have not yet been definitely established. For this reason, as with the other vitamins, the natural foods are to be preferred to the purified or synthetic ascorbic acid whenever possible; the latter, however, is available for oral or parenteral use, doses of 50 to 500 mg. being common.

Generally speaking, there is some local source of vitamin C available to the people of the world if they will but use it. Hunter and Tuba (1943) directed attention to the tremendous store of vitamin C in wild rose hips in Alberta. The further north one goes, the richer the rose hips become in ascorbic acid. Black currants are

another rich source of this vitamin. Elliott (1939) found black currant juice to be 50 per cent richer in ascorbic acid than the common citrus fruits. Fresh juice from the "Amla" gooseberry (India) is twenty times as rich in vitamin C as orange juice (Indian Information 10, 224, 1942). The cashew apple (fleshy peduncle of the cashew nut) is high in vitamin C (Mitra, 1940). Although guavas vary considerably in ascorbic acid content, dried guava powder has been prepared in South Africa (1943) with a phenomenal quantity of the vitamin—2.5 to 3.0 per cent. Dried rose hips sometimes reach 2 per cent concentration. This same year saw Canadian soldiers in the Far North getting sprouted soybeans as a source of vitamin C. Crushed pine needles steeped in boiling water make pine-needle tea, useful both in preventing and treating scurvy. Hemlock tea sweetened with maple sugar is a similar beverage. Injured bark of spruce trees exudes a sap which hardens on exposure to air. This spruce gum when freshly gathered and chewed probably furnishes some vitamin C. The West Indian (Puerto Rico) and Barbados cherry (Florida) also rate very high as sources of vitamin C even when consumed as home-made jelly (Mustard, 1946). Such examples could be continued *ad infinitum.*

Although vitamin C is widely distributed in fresh fruits and vegetables, much of the potency is lost during storage, sun-drying, cooking in much water in open kettles, and by various methods of preserving. The diet should contain an abundance of fresh fruits and vegetables to insure an adequate intake of this vitamin.

The citrus fruits and tomato juice (fresh, canned or bottled), although not extraordinarily rich, furnish a convenient source of ascorbic acid. Canned citrus fruit juice is the cheapest source of the daily ration. Tomato and pineapple juices cost two and four times as much respectively for the same quantity of vitamin (Holmes *et al.*, 1941). Oranges wrapped in paper and kept in airtight containers at room temperature retain their vitamin-C content about as well as those refrigerated (Robinson, 1940).

According to Munsell (1948) the average American diet derives its vitamin C primarily from oranges, potatoes, tomatoes and cabbage—in that order.

"Fully ripe oranges contain more of the vitamin than partially ripe fruit, and that exposed to sunlight is richer than that from the shaded side of the tree. The vitamin-C content of a given variety of orange decreases progressively as the season advances."—Munsell (1940). A dozen oranges of uniform size and appearance purchased from a single bin in a store in Washington, D. C. were found by the Bureau of Home Economics to range in vitamin-C content from 24 to 60 mg. of ascorbic acid per 100 cc. of juice. Tomatoes also show increased ascorbic acid due to greater exposure to sunlight during growth (Maynard, 1945).

In 1947 the American Medical Association Council accepted fruit juices which at the time of packing are:

	Mg. vitamin C per 100 cc.
Tomato	20
Grapefruit	35
Orange	40

"In apples, the vitamin is concentrated in the skin and in the flesh just under the skin. Since the proportions of skin to flesh is greater in small than in large apples, a small apple contains more vitamin C in proportion to weight than a large one."—Munsell (1940). Apple peel is said to have five times the vitamin C content of the flesh.

Like apples, oranges concentrate ascorbic acid in the peel. Segments of smaller oranges are higher in vitamin C than segments from larger fruit. Whole oranges or grapefruit provide 40 to 80 per cent more vitamin C than when reamed and their juices strained. Fruit stored for a time with considerable loss of weight shows a rise in vitamin C content due, perhaps to passage from rind to pulp (M. C. Smith).

Although raw meats (especially organs) may contain considerable vitamin C, practically all activity is lost during cooking. Milk fresh from the cow has a good supply of ascorbic acid, but by the time it is bottled and delivered to the consumer little of this remains.

Good Sources of Ascorbic Acid.

Black currants	Guavas	Persimmons
Broccoli	Kale	Pimentos
Brussels sprouts	Kohlrabi	Spinach
Cabbage, green, raw	Mustard greens	Sprouted grains
Cauliflower	Paprika	Strawberries
Collards	Parsley	Turnip greens
Dandelion greens	Peppers	Watercress

Fair Sources of Ascorbic Acid.

Asparagus	Green lima beans	Potatoes, new
Beet tops	Green onions	Red currants
Cantaloupe	Green peas, fresh	Rutabagas
Chard	Papaya	Sweet potatoes
Citrus fruits	Pineapple, fresh	Tomatoes

VITAMIN D.

Chemical Behavior.—According to Bills (1938) there are at least ten compounds possessing some antirachitic potency. All are secondary alcohols with a typical alicyclic structure (that is, ring compounds with straight chain characteristics). With the possible exception of cholesterilene, the various forms require irradiation to produce an antirachitic effect. In this process the complex nucleus is ruptured and the products are no longer sterols, though often regarded as such. When ergosterol is irradiated, the result is calciferol or vitamin D_2. Cholesterol when so treated first becomes

7-dehydrocholesterol, then the ring is broken with the formation of vitamin D_3. Vitamin D_4 is obtained by irradiation of 22-dihydroergosterol and is 22-dihydrocalciferol. The fifth well-known member of the vitamin-D series is irradiated 7-dehydrositosterol. The two forms most abundant in the preparations available for clinical use are D_2 and D_3.

Calciferol or D_2 (irradiated ergosterol) is a colorless, crystalline substance soluble in oils but not in water. It is not regularly affected by oxygen, dilute alkali nor acid. Calciferol is destroyed by steam in the presence of mineral acids. It is stable to heat and light. Ultra-violet irradiation of ergosterol produces several isomers in addition to calciferol (lumisterol, tachysterol, toxisterol, etc.) which are not only without antirachitic activity but which may have undesirable or toxic effects. Overirradiation destroys the antirachitic vitamin. Although relatively stable to heat and oxidation, the provitamins give a better yield on irradiation if oxygen is withheld during exposure.

In general, ergosterol is the precursor of vitamin D in vegetable organisms, and calciferol or D_2 is the form of vitamin D produced by irradiation of substances of vegetable origin, while D_3 (irradiated cholesterol) is the form derived from animal sources. Since vitamin D_3 is found in fish-liver oils, it is sometimes referred to as natural vitamin D.

Absorption and Storage. Under average conditions vitamin D is made by the skin, absorbed and stored there or transferred to other tissues. Its distribution is not thoroughly understood.

When given by mouth, bile is required for absorption of the vitamin. Mineral oil has been charged with washing out vitamin D and also interfering with absorption of calcium and phosphorus.

Ordinarily the body does not have to contend with destruction of grossly excessive amounts of vitamin D, nor is it troubled with an excretory problem.

Physiologic Action and Deficiency Effects. Vitamin D exerts a curative effect on rickets. Precursors (as cholesterol) in the skin are transformed into active vitamin by solar irradiation. Because pigmentation of the skin reduces its permeability to sunlight, negro babies and dark-skinned races require more ultra-violet for prevention or cure of rickets than do white children. The vitamin is absorbed when administered by massage with cod-liver oil or other fats containing it.

Vitamin D is necessary for normal bone formation but its exact rôle is not clear. It tends to protect tooth and bone structures against the effects of a low calcium intake by promoting better utilization of available calcium and phosphorus.

Clinical Estimation of Deficiency. The diagnosis of vitamin D deficiency is based upon the clinical picture of rickets, upon Roentgen-ray evidence of defective bone formation at the epiphyses, and upon blood serum calcium, phosphorus and phosphatase levels. In rickets the inorganic phosphorus falls to half its normal level;

the calcium usually is slightly low. The phosphorus varies with age: for infants 5 to 6 mg. are normal, for children 4 to 5 mg., and for adults 3.5 to 4 mg. P per 100 cc. Normal serum calcium varies from 9.5 to 11 mg. per cent. Therapeutic measures for rickets are generally held to be efficacious if the calcium remains above 9 mg. and the phosphorus above 5 mg. When the product of these two values (Ca x P) falls to 30 or lower, rickets usually is present. With the Bodansky method for phosphatase, normal adults vary from 1.5 to 4 units (av. 2.7) and children from 5 to 12 units (av. 8). The enzyme activity reaches 20 to 30 units in mild rickets and 60 or more in severe cases. If therapy is effective, a definite decrease is noted in three to four days; during active repair, high normal values are the rule.

Requirement.—The vitamin-D requirement varies with the amount of solar or artificial irradiation received and with the relative and absolute amounts of calcium and phosphorus in the diet. The ideal ratio of dietary Ca:P is 1.2:1 (Elvehjem, 1941) although it is customary to allow 1:1.2 in computing the diet. This discrepancy is due to the fact that a portion of the phosphorus (that present as phytic acid) is unavailable. Diets rich in calcium and phosphorus in the right proportion diminish the need for vitamin D.

Both infants and children should receive 400 U.S.P. units of vitamin D daily. The need for supplemental vitamin D by vigorous adults leading a normal life seems to be minimum. For persons working at night and for nuns and others whose habits shield them from sunlight, as well as elderly persons, the ingestion of small mounts of vitamin D is desirable (see p. 14). During pregnancy and lactation 400 units is advised.

Sources.—The **U.S.P.** and **International Unit** of vitamin D is equivalent to 0.025 micrograms of calciferol. Other units, now rarely used, include the Steenbock, American Drug Manufacturers' Association (A.D.M.A.) and Oslo units (refer to pp. 359, 350, 357).

Irradiated yeast and milk from cows fed with such yeast (so-called metabolized milk) contain vitamin D_2. On the other hand, vitamin D_3 predominates in fish liver oils, in eggs from hens fed cod-liver oil, and in irradiated milk and milk fortified with fish-oil concentrates.

As stated by Nelson (1938) fish which contain much body oil, such as salmon, sardines and herring, are the richest natural sources; eggs are next in importance; milk fat and meat products contain some vitamin D. Outstanding sources are the fish-liver oils. Lindsay and Mottram (1939) advocate using cod-liver oil as an ingredient in any dish which already contains fish. If this subterfuge is not revealed by the cook, the comestible usually is acceptable.

Despite the fact that green vegetables are grown in sunlight, they are practically devoid of antirachitic potency. Mushrooms, yeasts, and molds contain appreciable amounts of ergosterol which responds to irradiation. Irradiated ergosterol is sometimes added to commercial cake and bread. It is stated that 6 slices of bread, so

fortified, contain as much vitamin D as 1 teaspoonful of cod-liver oil. Cereals have been successfully fortified, but the amount of vitamin served is so small as to be negligible.

Since most foods contain little or no vitamin D, exposure of the body to ultra-violet light or use of fish-liver oils is the usual therapy. Cod-liver oil is required by the U. S. Pharmacopeia to contain at least 85 U.S.P. units per gram. As computed by Nelson (1939), a teaspoonful contains at least 312 units, calculated on the basis that this amounts to 4 cc. and the oil has a specific gravity of 0.92.

Overdosage of Vitamin D.—Excessive dosage has resulted in abnormal calcium deposition and tissue degeneration. Since these changes are associated with elevated serum calcium and phosphorus levels, their determination may serve as a warning. Except under close supervision, doses larger than 1000 to 3000 units should not be administered. Symptoms of vitamin D intoxication reported by Howard and Meyer (1949) include fatigue, loss of weight and appetite, vomiting, disturbed kidney function, lesions of the eyes and skin as well as elevated serum calcium.

VITAMIN E.

Chemical Behavior.—Although α-tocopherol exhibits the greatest potency of those substances so far synthesized and is synonymous with vitamin E, over forty compounds are known to possess vitamin E activity (Evans *et al.*, 1939). The most prominent in this chemically divergent group are the tocopherols, α, β, and γ, listed in diminishing order of effect. The vitamin was originally obtained from wheat-germ oil as α-tocopherol allophanate. The acetate, phosphate and succinate have also been prepared.

Alpha-tocopherol is a yellow viscous oil readily soluble in all the lipid solvents and only slightly soluble in water. It can withstand temperatures to about 200° C. Activity is destroyed by ultraviolet irradiation. Esterification occurs without loss of potency. Most of the esters prepared have been oils; the crystalline allophanate is an exception. The esters are relatively stable to air even when considerable surface is exposed.

Vitamin-E concentrates resist attack by acids, alkalies and hydrogen but are extraordinarily sensitive to slight and obscure oxidative changes in associated fats. The vitamin usually is inactivated if included in a diet containing lard or some of the fish-liver oils. The tocopherols possess anti-oxidant properties but in reverse to their vitamin activity. In giving protection, the tocopherol is itself irreversibly oxidized. Oxidation of the tocopherols is markedly retarded by inhibitors, as hydroquinone and ascorbic acid. Synthetic vitamin C is used to prevent rancidity in fatty emulsions like butter and mayonnaise.

The excellent keeping qualities of vegetable oils, such as cottonseed and wheat-germ oil, in comparison with lard and other animal fats which readily become rancid, is apparently due to their high

content of vitamin E or anti-oxidants found with the vitamin. This protective behavior is shown particularly by the synthetic chromans and coumarans, substances with a ring structure identical with or similar to that found in α-tocopherol.

Vitamin E is chemically related to vitamin K. Naphthotocopherol has been synthesized and found to possess fair vitamin E and K potency (Tishler, Fieser, Wendler, 1940). This is the first instance of any compound having the biological activity of two vitamins. Other vitamin-E compounds do not show vitamin-K properties nor do the naphthoquinones have any vitamin-E effect.

Absorption and Storage.—Bile apparently is necessary for absorption of all the fat-soluble vitamins (Greaves, 1939). Similarly, mineral oil is detrimental to absorption. Distribution of the tocopherols in body tissues is uncertain since variable findings have been reported. However, it is conceded that muscle tissue is low in vitamin E, yet this small amount is vital to its function. Storage would appear to be fair. Destruction of the vitamin occurs within the body possibly during muscular work.

Physiologic Action and Deficiency Effects.—Although the mechanism whereby vitamin E exerts its effects in the body are unknown, it is recognized that this vitamin is necessary for embryonic development and growth of the young, for maintenance of testicular function, and for normal behavior of the neuromuscular system (Evans, 1940). In the female, E-deficiency causes "resorption sterility" which is not permanent if the vitamin is restored. In the male the damage to the seminiferous epithelium is irremedial. The term "antisterility" vitamin is unfortunate since the function of this vitamin, insofar as reproduction is concerned, involves merely aiding or allowing a normal action to occur (Smith, 1940).

Nutritional muscular dystrophy and encephalomalacia have been produced by vitamin-E deficiency (Pappenheimer and Goettsch, 1931). Alimentary exudative diathesis is also a consequence of E-avitaminosis (Dam and Glavind, 1939); this edema, largely subcutaneous, is associated with a low-fat, protein-deficient diet.

Vitamin E is necessary in maintaining normal function of heart muscle. Animals on deficient diets have a habit of suddenly dying with "heart failure." In both animals and man use of tocopherols has corrected bleeding into various tissues (purpura hemorrhagica or thrombocytopenic purpura).

Vitamin E is an indispensable part of the metabolism of skeletal muscle, and is probably concerned with the contractile phase. The effect is such that muscular work is done with less oxygen than in E-deficiency. Inflamed, cramped muscles consume too much oxygen for their own good. Vitamin E seems to govern the consumption of oxygen. Muscular pain as seen in rheumatism, fibrositis, bursitis, lumbago, etc. may be due to lack of vitamin E. Milhorat and Bartels (1945) suggest that in progressive muscular dystrophy there is a defect in utilization of tocopherol through failure to form a condensation product with inositol in the gastro-intestinal tract.

Vitamin E exerts a protective effect upon vitamin A both in the intestinal tract and in the tissues where it is utilized. According to Hickman (1944) vitamin E must be present in the alimentary canal if the full benefit of carotene is to be realized. The stabilizing effect of tocopherol is more important for this pigment than for the vitamin. This beneficial effect is particularly noticeable when the supply of vitamin A is low. As has been so ably said, Nature's task of protecting fat and vitamins at 37° C. in the animal body charged with oxygen and oxidizing enzymes is difficult. Vitamin E appears to be a controlling factor. It probably is assisted in its anti-oxygenic action by cephalin, phenols, and ascorbic acid. Parenthetically, lemon juice has long been known to possess anti-oxidant properties and this can be attributed in part to its vitamin C content.

A fat-soluble form of vitamin C has been developed (1949) for use as a lard preservative in conjunction with lecithin and tocopherols. This agent, an ascorbyl ester with palmitic acid — *l*-ascorbyl palmitate, is anti-scorbutic and non-toxic.

In producing vitamin E deficiency experimentally, the intake of unsaturated fatty acids has to be high as well as the vitamin E low. Should peroxide forms of these fatty acids be produced in appreciable concentration, toxic effects would be manifest and this may be part of the picture in vitamin E deficiency.

Requirement. Little is known about the human need for tocopherols. A tentative suggestion is about 30 mg. per day for the normal adult, with the minimum placed at 10 mg.

Sources. Definite data as to the extent to which the human dietary may supply vitamin E are still lacking. So far as is known, there is an abundance of this vitamin in natural foods. However, vitamin E is milled out of white flour and no attempt has been made to restore this factor in the enrichment process.

The richest sources of vitamin E are green leaves and embryos of seeds or oils therefrom (barley, corn, cottonseed, flax, hempseed, red palm, peanut, rice, soy bean, and wheat). Smaller amounts occur in fat and muscle tissue, milk, butter, cheese and eggs. Oranges and bananas contain some vitamin E.

If it is desired to assure a high vitamin-E intake, the diet should be supplemented with wheat-germ. Capsules of wheat-germ oil are also available as a rich source of this factor. According to Shute (1938) wheat-germ oil even if refrigerated to prevent deterioration is not reliable after eight weeks. Stable preparations of whole wheat-germ are preferable; 1 ounce of wheat-germ furnishes about 3 grams of the oil. Defatted wheat-germ should, of course, be avoided when vitamin E is required.

VITAMIN K.

Chemical Behavior. Dam's "Koagulations-vitamin" (1935) has been chemically identified (1939) by two different groups of investigators (Doisy, Fieser). Active agents are 1, 4-naphthoquinones or

substances capable of yielding such quinones under biologic oxidation. Like the other fat-soluble vitamins, more than one substance shows activity.

Vitamin K occurs in the non-sterol fraction of the unsaponifiable fat and resembles vitamin E in solubility and resistance to heat (Osterberg, 1938). It is destroyed by alkalies and certain substances which bring about oxidation (Munsell, 1940). Although vitamin K is rapidly inactivated by light, whether natural or artificial, when dissolved in benzene, ethyl alcohol or acetone, crude alfalfa extracts are fairly stable toward light (MacQorquodale, 1939).

Absorption.—The fat-soluble forms require bile salts for absorption but the water-soluble vitamin K_5 is effective orally without the presence of bile (Butt *et al.*, 1941). Mineral oil leads to prothrombin deficiency presumably due to interference with absorption (Elliott *et al.*, 1940). Russell and Page (1941) have demonstrated that a single dose of 10 mg. of 2-methyl-1,4-naphthoquinone in an ointment base rubbed into the back protects infants one to two days old from hypoprothrombinemia. Storage presumably occurs in the liver but is limited.

Physiologic Action and Deficiency Effects.—Vitamin K is essential for the synthesis of plasma prothrombin but the manner of accomplishing this is not clear except that the action appears to be enzymatic. Inadequacy of prothrombin prevents normal clotting of blood and permits slow oozing from traumatized blood-vessels particularly in the new-born and after surgery upon jaundiced patients. Vitamin K is of no value in hemorrhage unless it is caused by lack of prothrombin.

For the production and maintenance of vitamin-K levels in the body there are four requisites: a well-balanced diet, an adequate flow of bile, a functioning intestinal absorbing area, and a physiologically normal liver. Primary vitamin-K deficiency probably is not common. Under ordinary conditions a nutritional deficiency would be slow in developing and would be easily corrected.

Clinical Estimation of Deficiency.—Suitability of a patient for vitamin-K therapy is determined by the prothrombin clotting-time of the blood. Either thromboplastin from lung or brain tissue or Russell viper venom are used to produce the clotting. The results are reported in seconds required to form a clot or in percentage of normal time. A decrease to 80 per cent is significant and values below 50 per cent usually are associated with bleeding. Restoration to normal clotting activity is accomplished within hours by administration of vitamin K provided liver function is normal.

Requirement.—No data are at hand for estimating the requirement of vitamin K. Its present use is restricted to therapeutic prescriptions for abnormal conditions.

Sources.—The fat-soluble vitamin K occurs in hog-liver and soy bean oils, spinach, kale, carrot tops, cabbage, cauliflower, tomatoes and egg-yolk. The antihemorrhagic factor which occurs

in green leaves in large quantities apparently is not affected by withering or yellowing of the leaves. Flowers, roots and seeds contain much less than green leaves (citation from Daniel, 1940). Dried alfalfa leaf meal and putrefied sardine meal are good sources of this vitamin. Evidently it can be synthesized under bacterial action and, therefore, is a normal constituent of human feces. Cod-liver oil, wheat-germ and wheat-germ oil do not exert any anti-hemorrhagic effect. It is noteworthy that although vitamin K can be derived from fish meal, it is not found in fish-liver oils.

VITAMIN INTER-RELATIONSHIPS AND ANTAGONISMS

More than forty specific individual factors are now recognized as part of the picture of normal nutrition. Each of these must be correctly adjusted to the others although there is considerable leeway at times. Disproportionate amounts of one tend to alter the behavior of others. Serious imbalance is likely to be set up through indiscriminate vitamin dosage. Administration of food factors in high concentration as "chemicals" is no more desirable than intake of refined sugar, 99 per cent pure, perhaps less so. Vitamin preparations are valuable for diagnostic and therapeutic purposes, but their routine ingestion is as apt to create health hazards as correct them.

The amount of information already acquired on the inter-play of carbohydrates, proteins, fats, minerals and vitamins is staggering. It is probable that the greatest advances in the immediate future will be along such lines. Attention is directed to the review by Elvehjem, C. A. and Krehl, W. A. on "Imbalance and Dietary Interrelationships in Nutrition," J. A. M. A. **135**, 279, 1947.

Some vitamins enhance each other's activity, that is, are synergistic, while others are antagonistic. A few can produce relatively independent symptoms of deficiency or overdosage, whereas others are so closely dependent upon one another that it is difficult to learn their exact rôle. Drugs for combatting infection are likely to affect vitamin behavior.

There are variable degrees of antagonism. Some are concerned merely with normal check on overactivity. Others are powerful inhibitors, often being similar in structure to the vitamin antagonized. There is already a long list of agents chemically related to the individual vitamins but lacking biological activity or else asserting antagonistic behavior through competitive action.

CHAPTER 10.

EFFECT OF PROCESSING UPON FOODS.

Introduction.—The most complete résumé to date with reference to the effect of cooking and canning upon the vitamin content of human foods is that of Margaret A. Boas Fixsen (*Nutrition Abstracts and Reviews*, **8**, 281, 1938). Because of the limited number of analyses, the data on vitamins A and B_1 are not reproduced. Representative values for vitamin C are given in Table 52. Boas Fixsen states emphatically that "these actual values should not be used to calculate the vitamin content of a diet containing cooked materials. This should be calculated from the vitamin content of the raw materials and due allowance then made for the losses occurring during cooking." To aid in the estimation of the probable vitamin intake brief comment is offered on the several vitamins.

A very considerable amount of investigation has gone into the question of vitamin retention during processing of foods. Many of these experiments have caught popular fancy and persist even though shown to be erroneous. Most people still believe that metal cutlery and sieves destroy vitamin C on contact. They still think that orange juice squeezed the night before and refrigerated is sadly lacking in vitamins at breakfast.

It is difficult for the uninitiated to understand the complexities of the problem: the endless search for improved methods of determination; the constant alertness to achieve duplicability; the never-ending elimination of confusing factors; the testing and testing again and again. Even under carefully standardized conditions various investigators may fail to agree, particularly as to the extent of vitamin loss. There is no doubt about it that harvesting and cooking practices can be fatal to vitamin content but there is ample proof that these agents sometimes survive amazingly well due to the presence of natural stabilizers. Countless more experiments must be performed before we have the complete picture.

The literature is replete with fragmentary information on the effect of cooking upon the vitamin potency of many foods. At present one must be guided by generalizations, such as shown on p. 349. Additionally, one should avoid overcooking. Conservation of vitamin content depends on securing the least exposure to air, the smallest amount of water, the lowest temperature, and the shortest time which will yield a palatable dish. Each cooking method should be examined to see where it can be improved in these respects. What is excellent for retaining vitamins in one food, however, may not be suitable for another.

Vitamin A.—Ordinary cooking and canning have remarkably little effect upon the activity of vitamin A. Even in butter subjected to frying, roasting or pastry-making the vitamin suffers

little diminution (Scheunert and Wagner, 1931). Prolonged heating leads to some vitamin destruction, although Munsell (1940) is of the opinion that the destruction is always appreciable in roasting.

Milk undergoes ordinary heating or pasteurization without affecting its vitamin A content. Evaporation and drying processes also are accomplished without loss. Likewise, spray-drying of eggs conserves the vitamin.

The excellent keeping qualities of vegetable oils, such as cottonseed and wheat-germ oils, in comparison with lard and other animal fats which readily become rancid, is apparently due to their high content of vitamin E. When this vitamin is removed from the vegetable oils, they turn rancid rapidly. According to Golumbic (1940) lard can be kept fresh from two to thirty times longer than usual by the addition of vitamin E or the related synthetic products, coumarans and chromans.

It is generally expected that carotene will be retained in vegetables regardless of the method of preparation or cooking. However, exceptions occur although their cause is not wholly understood. Hewston *et al* (1948) reported that boiling frozen lima beans in a small amount of water resulted in 86 per cent retention of carotene while double the cooking water gave only 78 per cent. Similarly, boiled dry peas showed an average carotene retention of 85 per cent, and green spring cabbage only 67 percent although this was far above the retention of carotene in cooked green fall cabbage, viz., 33 per cent!

Typical results showing the effect of canning upon carotene are shown in Table 46.

TABLE 46.—**Percentage Retention of Carotene in Canning Processes***

Food items.	*Maximum*	*Minimum*	*Average*
Apricots	98	77	89
Carrots	100	83	97
Corn, yellow	100	87	97
Green beans	96	81	87
Peaches	100	59	85
Peas	100	88	97
Tomato juice	74	60	67
Tomatoes	89	45	80

* Cameron, E. J. *et al.*, Am. J. Pub. Health **39**, 756, 1949.

De Felice and Fellers (1938) call attention to the marked losses of carotene incident to drying. They report average carotene values converted to international units per *gram* as: fresh spinach 718, frozen 545, canned 481, and dried 495. When these figures are calculated on the dry basis for better comparison, their approximate range is from 5200 to 7000 against 500. Storage of frozen or canned spinach for seventy-three days had no effect on the carotene content. These investigators cite Eddy (1937) as demonstrating that there was no appreciable diminution in carotene in spinach even after three years' storage.

According to Fellers (1936) the loss of vitamin A in reheating

canned foods for the table is small; sun-drying causes greater deterioration in vitamin activity than artificial dehydration; and storage is slowly destructive to vitamin A.

Bicknell and Prescott (1947) point out that fats used over and over again for deep drying may develop an anti-vitamin A factor whose presence in the diet is detrimental to vitamin A sources simultaneously consumed.

Thiamine and Ascorbic Acid.—Attention is shifted from the stable carotene to ascorbic acid, most sensitive to environment, and to thiamine, a close second (ignoring the newer B-vitamins). Instructions for conserving vitamins are directed chiefly to these two. In the vast array of tests performed to learn the extent of their losses on processing, one can find justification for almost any range of opinion. Whether loss is slight, moderate, or severe depends on circumstances at the time, upon factors which often refuse to follow predictions.

General statements based on tests of a few foods can be entirely inaccurate when applied to other foods. Take, for instance, the matter of using soda in cooking water. It is undeniable that both thiamine and ascorbic acid are destroyed more readily in alkaline than acid media, but reaction is never the only variable at work. Characteristics of individual foods must be considered. For example, thiamine in peas will stand exposure to soda (Johnston, 1943). Citing Hewston (1948), peas boiled in water, with or without salt, retained about 70 per cent of ascorbic acid, thiamine, and nicotinic acid. "When just enough soda was used to preserve the color of the peas without affecting natural flavor—slightly less than $\frac{1}{8}$ teaspoon soda for 680 gm. of shelled peas and 300 ml. water—the retention of ascorbic acid and thiamine was the same as in peas cooked without soda. The cooking time was just sufficient to give a tender product. The use of this small amount of soda cut the cooking time approximately in half. General recommendations as to the use of soda in cooking vegetables must await further study on different vegetables and also study of the water in different localities." In sieving peas the loss was 5 per cent for the cold product and 15 per cent for the hot vegetable. The retention of ascorbic acid for thawed frozen peas cooked 7 minutes was about 60 per cent, compared to 70 per cent for fresh peas cooked 17 minutes in water alone or for 8 minutes in water containing soda.

Conclusions really are valid only when full details accompany the statement, and condensed versions of experimental findings may be misleading. This warning is issued lest any reader take the data herein too seriously. One would like to select all the common foods and report what the consensus of opinion appears to be regarding the best method of conserving the vitamin content of each, but space does not permit. However, further findings by Hewston are given for two other important foods, viz., potatoes and carrots.

Potatoes.—Potatoes best retained mineral and vitamin values on being boiled whole and unpared. Pressure-cooking gave about 80 per cent retention of ascorbic acid for pared, quartered potatoes, a

result similar to baking in their skins. Baking, however, resulted in only 70 per cent retention of thiamine as contrasted with 85 per cent on boiling whole and unpared.

Mashed potatoes prepared from tubers boiled whole unpared showed 87 per cent retention of the vitamin C content of the raw vegetable. Pressure-cooked quartered potatoes gave 66 per cent, boiled quartered pared tubers 52, and boiled whole pared potatoes 47 per cent retention. Mashing alone accounted for about 10 per cent loss. Hash browning destroyed about one-fourth of the ascorbic acid remaining after considerable loss overnight in the refrigerator; greater decrease followed further browning. Frying gave about 60 per cent retention of vitamin C. Low thiamine recovery occurred in hash browned and fried potatoes. Although it is generally felt that soaking pared, quartered potatoes in water overnight and using salt in the cooking water leads to additional loss of vitamin C, these investigators report no such loss, but are unwilling to generalize further.

Sweet potatoes boiled whole retained all their ascorbic acid and 89 per cent of the vitamin when baked whole. Cutting in half before baking reduced the vitamin retention to 31 per cent.

Carrots.—Potato skin is highly protective but not so carrot skin. Whole boiled carrots retained approximately 90 per cent of ascorbic acid and almost 100 per cent of mineral matter (Hewston). Cross slicing resulted in destruction of ascorbic acid and escape of niacin into the water although carotene was retained. Slicing crosswise and cooking in a pressure saucepan gave ascorbic acid values about equal to whole carrots boiled in water (amount immaterial) and 20 per cent higher than the sliced boiled vegetable (water volume important). Salt had no influence upon whole carrots boiled in water but lowered the vitamin C retention in sliced and quartered sections. In the presence of salt, carrots lost mineral matter into the water.

Shredding carrots for salad caused an immediate loss of 20 per cent and an additional 20 per cent loss after holding one hour, but no further decrease up to five hours. Surface area is important in this loss. Wedges, shreds, and gratings held an hour retained vitamin C to 88, 61, and 24 per cent respectively. It should be stressed here, as in many other controlled experiments, that plastic and metal utensils showed no difference in their effect upon vitamin C.

Thiamine.—Vitamin B_1 can be destroyed by high and prolonged moist heat (that is, temperatures over 100° C. for several hours). Milk powder, however, when subjected to dry heating in air at 100° C. for as much as forty-eight hours, has been reported to lose only a small portion of its activity (citation by Munsell, 1939). Milk suffers some loss of its thiamine potency during pasteurization, whereas it is not affected by boiling for ten minutes.

Thiamine is lost both by extraction in cooking water and by destruction under heat. In general, the greater the surface exposed, the greater the loss of vitamin into the surrounding water. These factors can be controlled with consequent conservation of the vita-

min. "When foods are cooked by boiling, the proportion of vitamin B_1 destroyed is relatively small up to cooking periods as long as one hour, and generally does not exceed 10 to 15 per cent unless the food is distinctly alkaline or has been made so by the addition of soda" (Munsell, 1940). According to Aughey and Daniel the loss in boiling vegetables may amount to 20 to 25 per cent. Roscoe found that about half of the thiamine content of spinach passed into the cooking water during fifteen minutes' boiling. Munsell and Kifer observed a 50 per cent loss on cooking broccoli. Losses of this order are to be expected with most green vegetables but the anticipated decrease in thiamine content is much less with root vegetables (Boas Fixen).

Freezing *per se* does not affect the thiamine content of vegetables but the preparatory blanching and subsequent cooking lower the vitamin value, often appreciably. It should be recognized, furthermore, that thiamine is more readily extracted from vegetables after freezing than before.

The loss of activity in cooked foods, however, is sometimes remarkably small. Possibly the stability of the thiamine in foods is dependent upon its existence as the pyrophosphoric ester (Williams, 1939). Since whole cereals constitute an important natural source of thiamine, it is notable that cooking of cereals sometimes does not seriously lessen their B_1 potency. Findings in the literature vary considerably regarding loss in such common items as bread and biscuits. It is generally regarded that products baked with yeast show very much better retention of thiamine than those subject to the action of baking powder. Some have claimed complete loss of the vitamin in baking powder biscuits. In this connection Table 47 should be examined. Possibly all types of baking powder do not give the same response owing to variable sensitivity to salts.

TABLE 47. Percentage Thiamine Retention in Bread and Biscuits*

Product	*Baking Period*	*Thiamine Retention*
Yeast-raised Bread:		
Enriched white flour	40 min. at 375° F.	65.9
Whole wheat flour	" "	92.5
Yeast-raised Rolls		
Enriched white flour	14 min. at 425° F.	69.8
Whole wheat flour	" "	64.5
Baking powder biscuits:		
Enriched white flour	14 min. at 425° F.	81.6
Whole wheat flour	" "	88.8

* Hewston, E. M., and others, U. S. Dept. of Agric., Misc. Publ. No. 628, 1948.

Aughey and Daniel (1940) reported a 15 per cent loss in thiamine in baking bread and no destruction of whole grain cereals in double-boiler cooking. The only cereal examined by Hewston was rolled oats and her values reveal 80.6 per cent retention of thiamine on $2\frac{1}{2}$ minutes' cooking in a saucepan as contrasted with 66.8 per cent retention after 30 minutes in a double boiler. These differences are cited as warning against assuming too much from any lot of data.

Since difficulties in controlling variables, in taking samples, and in determining vitamin concentrations are very real, hasty conclusions are to be avoided.

How processing affects nutritive values of grain foods has been discussed by Nordsiek (1949). In the United States, wheat is far ahead of all other cereals used. Together with corn, it accounts for 90 per cent of cereal consumption. The remainder consists of rice, oats, rye and barley in order of their prominence. These cereals are subject to milling, manufacturing processes, restoration and supplementation of their nutritive values. Application of heat, including toasting of cereals always results in loss of thiamine. In commercial bread-making a surplus of 20 per cent thiamine is added to offset the expected loss due to baking. In the preparation of breakfast cereals, a fortifying mixture is sprayed after toasting while the product still is hot enough to drive off the moisture but not warm enough to affect thiamine. Cereals during processing often come into contact with iron vessels and acquire some extra iron. Yeast used in bread may contribute roughly 3 per cent of the thiamine in the finished loaf, 13 per cent of the riboflavin and 4 per cent of the nicotinic acid. White flour similarly contributes 15 per cent of the thiamine, 9 per cent of the riboflavin, 25 per cent of the niacin and 40 per cent of the iron. Non-fat milk solids may account for 19 per cent of the riboflavin as well as furnishing calcium and highly desirable amino acids.

In cooking rice, all the water should be absorbed. This cereal is variously processed to restore some of the vitamin loss in polishing and generally should not be washed before cooking and certainly not rinsed afterwards. Spruyt and Donath (cited by Boas Fixsen) found that puffed rice which had been exposed to 15 atmospheres' pressure at 150° to 160° C. was devoid of thiamine.

According to De Caro and Locatelli, half of the thiamine escapes into the boiling water during the cooking of Italian pastes.

Canning is more destructive of thiamine than is ordinary cooking because of the higher temperatures used. This includes both vegetable and meat products. Arnold and Elvehjem (1939) found pork to lose over 80 per cent of its thiamine content when given a heat treatment at 121° C. for one hundred and ten minutes. From Table 48 it is obvious that roasting very considerably lessens the thiamine potency of meats. Swine are exceptional in their storage of thiamine but high values are dependent upon excellent feeding. Garbage diets are not conducive to thiamine-rich pork. Supplementation with yeast and peanut skins has been suggested to raise the vitamin level.

The vitamin loss attributable to canning starts with the blanching (scalding) process. Many procedures are employed and efforts are being made commercially to modify methods so as to conserve food values. However, at present this treatment with steam, hot water, hot sirups, etc. while it improves appearance, retains flavor, destroys enzymes, eliminates air and aids in proper filling of cans, is

a drain upon the nutritive value of the food. The degree of loss is highly variable. It is expected that carotene will not be affected but decrease in ascorbic acid, thiamine, riboflavin and nicotinic acid is appreciable. Soluble carbohydrates will experience an average loss of 30 per cent while protein decrease is not likely to be more than 10 per cent. Sometimes the mineral loss is 50 per cent. A very considerable amount of potassium is lost, and some phosphorus, but the calcium content may rise on exposure to hard water.

TABLE 48.—Stability of Thiamine During Household Cooking Processes.*

Process.	*Meat.*	*Time of processing.*	*Destruction of thiamine. %.*
Baking	Pork loin	60 minutes	50
Braising	Pork chop	13 minutes	15
Broiling	Beef round	20 minutes	50
Frying	Beef round	20 minutes	0
	Pork: ham	15 minutes	0
	Ham, smoked	15 minutes	10
	Loin	Medium well done	35
	Veal hindquarter	20 minutes	45
Roasting	Beef round	2.5 hours	61
	Pork loin	1.5 hours	50
		43 min./lb.	43
	Veal hindquarter	2 hours	58
Stewing	Beef heart	60 minutes	55
	Kidney	45 minutes	40

* From Mickelsen, O., Waisman, H. A., and Elvehjem, C. A.: Jour. Nutrition, **17**, 269, 1939; Aughey, E., and Daniel, E. P.: Ibid., **19**, 285, 1940.

The heat sterilization employed in canning chiefly affects the thiamine content. Again the losses are highly variable, being influenced by time of exposure, height of temperature, size of can, presence of salts as acetates or phosphates, reaction of medium, etc. Small cans show less loss than larger sizes since less time and less heat are required for sterilization. Similarly, any processes which hastens heat penetration, as agitation, is beneficial. Thiamine in food nearest the outside of the can is destroyed to a greater extent than that in the center. Losses, of course, are computed for the total can contents, not just the drained solids most commonly consumed. Analyses are reported in Table 49.

TABLE 49.—Percentage Retention of Thiamine in Canning Processes.*

Food items.	*Maximum.*	*Minimum.*	*Average.*
Asparagus	85	60	67
Corn, yellow	48	20	34
Green beans	90	55	71
Lima beans	67	32	47
Peaches	93	64	76
Peas	70	40	54
Tomato juice	100	73	89
Tomatoes	100	89	96

* Cameron, E. J. *et al.*: Am. J. Pub. Health **39**, 756, 1949.

Storage of canned foods is accompanied by gradual vitamin loss, the extent depending upon the nature of the food, the storage temperature, and the length of time. Deterioration at summer temperatures can be fairly rapid even carotene showing some decrease. While canned foods probably remain edible so long as the can is intact, the nutritionist is justified in the hope that some day these foods will be held in cool storage until released to the housewife, not for further storage, but for prompt use, with the total lapse of time no more than a year.

Initial changes in canned products occur promptly and are due to the amount of trapped air and the type of container used. Thereafter, temperature is the main factor. At body temperature loss in vitamins C and B_1 are marked. At 21° C. these vitamins are 75 to 90 per cent retained (Feaster *et al.*, 1949). The retention of carotene, vitamin D, nicotinic acid, riboflavin, and pantothenic acid is higher. Quality of the product is retained well for a year at this temperature.

Older methods of preserving foods, as salting, brining, and drying, generally retain much of the thiamine but blanching operations take their toll. Vegetables lose about 15 per cent of the vitamin during blanching. Reported losses in dehydrated meats vary from 25 to 50 per cent. Thiamine is rapidly destroyed in dehydrated vegetables and meats when the moisture content is about 5 per cent

Sulfuring of fruits adversely affects thiamine content but conserves vitamin C.

Riboflavin.—"In contrast to vitamin B_1, riboflavin is less stable when heated in a dry mixture than in one that is watery or even only moist" (Munsell, 1940). This vitamin, then, generally withstands ordinary cooking although loss is occasioned by the leaching effect of hot water. Stewing, for example, is not detrimental.

Hewston *et al.* (1948) found simmered chicken retained 70 per cent and boiled chicken 55 per cent of the original riboflavin, the remainder being in the broth. Boiled vegetables retained 60 to 90 per cent of this vitamin and the results did not appear to be influenced much by varying the volume of water or cooking time. Based on a study of 20 common foods, this group of investigators concluded that the baked and fried foods, as well as cereals, retained 100 per cent of their initial riboflavin. Although both frying and roasting have been reported to result in considerable loss of riboflavin (30 to 60 per cent), the work herein cited showed excellent retention of riboflavin in frying and braising liver. Probably one should consider the general loss in roasting and frying to be the figures just cited.

Destruction can be rapid in alkaline solution although some foods are less affected than is expected. Even storage at room temperature under alkaline conditions leads to gradual loss of potency. Storage in general is associated with a diminished vitamin activity. The drop in cold storage meats even in a few days is appreciable. Butter also loses part of its riboflavin content in cold storage.

Light should be excluded so far as is feasible in both storage and in cooking as serious loss of riboflavin results. Glass containers,

therefore, have their disadvantage. No food desired for its riboflavin should be allowed to stand in strong daylight, let alone sunlight. As much as 48 per cent of this vitamin may be lost in eggs, milk and chops through cooking while exposed to light (cited by Bicknell).

Dehydration and quick freezing cause only small loses in riboflavin. Canning occasions little loss, but the data shown in Table 50 cover the entire contents and an appreciable portion (possibly 30 per cent) of the vitamin may be in the fluid and so apt to be discarded.

TABLE 50.—**Percentage Retention of Riboflavin and Nicotinic Acid in Canning Processes.***

	Riboflavin			*Nicotinic Acid*		
Food items.	*Maximum*	*Minimum*	*Average*	*Maximum*	*Minimum*	*Average*
Asparagus	100	65	88	100	77	96
Corn, yellow	100	68	97	96	72	86
Green beans	100	85	96	100	80	92
Lima beans	100	50	87	100	77	85
Peaches				92	87	89
Peas	100	70	82	80	50	65
Tomato juice	100	86	97	100	83	98
Tomatoes	100	100	100	100	92	98

* Cameron, E. J. *et al.*: Am. J. Pub. Health **39**, 756, 1949.

According to Sherman, there is no serious diminution of the riboflavin content of milk on pasteurization or preservation by drying or canning.

Nicotinic Acid.—This vitamin is one of the most stable, foods having been heated in an autoclave or pressure cooker as long as 6 hours without showing a decrease in effectiveness. It is not sensitive to light nor alkali and is not affected by exposure to air.

In roasting, braising and frying, 70 per cent or more of the nicotinic acid is likely to be retained, provided all fluid is used. In cooking chicken in water, Hewston found 70 per cent of the vitamin in the broth. Vegetables likewise lost nicotinic acid to cooking water in varying degrees. Canned foods, in general, retain appreciable amounts of the vitamin. Findings in Table 50 include fluid as well as solid content.

Other Members of the B-Complex. Consult data on pp. 291–297.

Ascorbic Acid.—The review of the effect of cooking and canning upon Vitamin C by Boas Fixsen is very illuminating although several questions have not yet been settled. The extreme sensitiveness of ascorbic acid to oxidative change necessitates unusual care in its extraction for determination. Despite its popularity, "there appears to be a growing tendency to distrust chemical estimations and to affirm that biological tests should be employed to a larger extent in confirmation of conclusions reached by other methods." It is possible that the chemical determination before and after cooking may in neither case represent actual vitamin-C potency. Although it is an established fact that heat in the presence of air will destroy ascorbic acid, analyses have been reported which show an increase

in the cooked product over the raw. The two important theories attempting to account for this observation are the "ester" and "oxidase" hypotheses. It is possible that heat decomposes an ester of ascorbic acid or at least renders the extraction of the vitamin more complete, owing to the softening of woody tissues. This concerns the availability of the vitamin in the alimentary tract. According to the "oxidase" theory, the reported results on the raw foods would be too low because of the destructive action of the enzyme during extraction. Should this prove to be the case, such destruction would likewise be appreciable during mastication and the early stages of gastric digestion. However, it seems more likely that interfering substances account for the increased values.

In plant tissues vitamin C occurs as ascorbic acid. Oxidases rapidly convert this reduced form into dehydroascorbic acid with subsequent further oxidation. Copper possesses a catalytic effect in aiding these changes. Its presence, therefore, is highly detrimental to vitamin potency. Both in canning fruits and vegetables and in the pasteurization of milk this agent is avoided as far as possible. According to Gould (1941) milk averages 25 mg. of ascorbic acid per quart when freshly drawn. On aging, the milk loses $\frac{1}{3}$ to $\frac{1}{2}$ of this vitamin through destruction by dissolved oxygen. Heating the milk causes greater loss than does holding. Deoxygenated milk exposed to sunlight does not lose its vitamin C. Hand *et al.*, (1939) noted that riboflavin was the agent which led to destruction of ascorbic acid in milk under the action of light.

According to Boas Fixsen, slow oxidation sets in as soon as fruits and vegetables are gathered. Storage under acid conditions tends to delay inactivation of ascorbic acid. Any process which breaks down the cellular structure (as peeling, chopping, mincing, shredding, etc.) liberates the oxidases which attack the vitamin. Nevertheless, it must be remembered that covitamins or stabilizers in vegetable and fruit extracts tend to protect the vitamin. The utensils used for cutting fruits or vegetables have been studied with conflicting results, no doubt due to co-incident factors which have protected or enhanced the attack upon vitamin C, in addition to the recognized influence of exposed area, temperature before and during processing, and light falling upon the food. The chief requisite would seem to be a sharp knife and a clean cut with minimum squeezing and manipulation. The sort of knife blade which darkens after use on fruits or vegetables or rusts readily if left around damp undoubtedly is not good to use but stainless steel should not be harmful. Curran *et al.* (1937) discovered that apples cut into quarters lost about one-fifth of their activity in an hour at room temperature, one-third in three hours. Shredded cabbage or carrots also lose their vitamin-C content on standing. Orange juice prepared at night for use in the morning, even though stored in the refrigerator, has been reported to lose 10 to 20 per cent of its potency although Munsell (1940) states that activity may be unimpaired for twenty-four hours in covered containers in household ice-boxes. Tomato juice, once

removed from the can, deteriorates after several days at refrigerator temperatures. Alkaline vegetable juices lose vitamin potency to a much greater extent. Sauerkraut juice cannot be depended upon to contain any vitamin C.

Commercial dairy orange beverages investigated by Mack, Fellers *et al.* (1936) contained 0.3 to 9.3 mg. of ascorbic acid per 100 grams; this amounted to about 10 per cent of the vitamin-C content of fresh orange juice. Since the vitamin is lost rapidly on standing at room temperature, these reconstituted orange beverages are not a satisfactory carrier of vitamin C.

Considerable investigation, however, has gone into this problem and the ascorbic acid retention of various preparations (freshly delivered, canned concentrates, and frozen products) is steadily rising as manufacturers solve their problems and consumers carry out directions more faithfully. At 0° to 10° C. loss of vitamin C is slow enough in juice to permit its retail distribution (Evenden and Marsh, 1948). Use of SO_2 lowers the rate of oxidation and this is regarded as the best preservative when used in conjunction with sodium benzoate.

As reviewed by Rose (*Jour. Am. Med. Assn.*, **114**, 1356, 1940) citrus fruits in cold storage and their frozen juices retain ascorbic acid very well. The vitamin-C content of frozen berries is also preserved.

Bailey (1938) found twelve commercial brands of canned tomato juice to vary from 12 to 26 mg. per cent; a yellow variety was rated at 32 mg. of ascorbic acid. According to Tressler (1938) tomato juice packed in bottles does not lose ascorbic acid any faster than in cans if the containers are completely filled. As pointed out by Munsell (1940) "inactivation of vitamin C in canned goods is directly and specifically related to the size of the head space." Concentration of tomato juice to prevent separation of suspended solids results in a 25 per cent loss of vitamin-C activity (Maclinn and Fellers, 1938).

Fresh cucumbers contain significant amounts of ascorbic acid. This is retained in fresh pickles (cooked in vinegar, sugar, spices, salt) but is lost on storage.

Klodt and Stieb (1937), cited by Boas Fixsen, have observed that the addition of table sugar or salt (0.25 to 2 per cent) retards the oxidation of ascorbic acid in diluted lemon juice and pure solutions of the vitamin at room temperature. (See also p. 313.)

Jam retains somewhat less than half the original vitamin C in the fruit if not stored too long. The vitamin is protected by the high sugar concentration. Superior methods of processing and addition of vitamin C can furnish an excellent product which will keep well for a season in a cool place. Once opened, the jam should be used quickly.

Vinegar acts as a mild oxidizing agent on the vitamin C in shredded cabbage (Munsell, 1949). French dressing is not so destructive. One would expect the salad oil to be protective but it seems

not. According to Clayton and Goos (1947) some agent in the seasonings is responsible.

"Fresh" vegetables exposed to air under ordinary conditions may lose an appreciable part of their vitamin-C value. Although destruction by air progresses steadily at room temperatures, it is retarded by refrigeration. Frozen or cold storage foods, on the contrary, tend to retain their potency longer. According to Bessey (1938) frozen foods should not be defrosted prior to cooking since slow thawing of vegetables tends to rapid loss of ascorbic acid. Cooked, frozen vegetables are slightly lower in vitamin C than fresh cooked, but are considerably higher than the canned vegetable which has been heated for the table (Fellers, 1935).

Vitamin C is a highly perishable nutritive quantity especially in vegetables. Once harvested, deterioration sets in. Transportation under summer conditions and exposure on the market, especially when deprived of natural covering (as shelled peas or beans), result in prompt loss of ascorbic acid. To preserve the vitamin in the fresh vegetables there must be little delay between gathering and blanching preparatory to quick freezing. The loss at −17.8° C. (0° F.) is negligible but carelessness in temperature control during shipment or retail storage is disastrous to the vitamin content. Since quick-frozen foods require less cooking time than fresh vegetables, the vitamin loss should be less but this is balanced by the initial decrease during blanching. In general, properly handled quick-frozen foods are equal in ascorbic acid content to freshly harvested vegetables and superior to those which have stood in the market.

Members of the cabbage family can lose 50 to 80 per cent of their vitamin-C activity after two to four days of ordinary storage. Potatoes suffer much loss by winter storage. Under ordinary home conditions there is a 50 per cent decrease from December to May (Lyons and Fellers, 1939). For conservation of this vitamin in cooked potatoes, refer to p. 313. In baked potatoes the concentration of the ascorbic acid is greatest in the central portion; next, in the medial portion; and least in the skin, as shown by the respective averages of 14, 11.4, 8.6 mg. per cent.

Acid vegetables, as rhubarb and tomatoes, do not lose vitamin C rapidly whether stored at room temperature or kept cold. Deterioration of vitamin potency in cabbage is retarded by refrigeration. Spinach and other greens show marked losses at room temperature.

Fresh onions are a good source of vitamin C, but after storage a poor one. Cooked and dried onions possess little vitamin-C potency.

According to Dunker, Fellers and Fitzgerald (1937) raw, fresh-cooked (cut or cob), frozen, and whole grain canned sweet corn are all moderately good sources of vitamin C., viz., 7 to 10 mg. per cent. Cream-style canned corn is a little lower than whole-kernel. Corn can be picked and stored in the husk for a few days without affecting its vitamin-C content. Frozen corn can be defrosted and canned

corn kept in the ice-box for several hours after opening without appreciable loss of ascorbic acid.

Dried vegetable powders are of doubtful value as a source of vitamin C. Mathiesen (1939) reports for green cabbage powder 250 mg., chive powder 150 mg., cabbage powder 60 mg., and parsley powder 120 mg. per cent. These values for freshly prepared powders decreased steadily during storage to half the original amount in a few months and to zero in a year.

Fruits are a desirable source of vitamin C since they are often eaten raw. When cooked, they are generally accompanied by the extracted juices. Their acid nature is further protection against rapid loss of the vitamin. Baked apples, however, are apt to be of lower ascorbic acid content than apple sauce because of the high temperature used. Apple pie loses half of its residual vitamin-C content on standing at room temperature for forty-eight hours. Curran found hot apple sauce to decrease its ascorbic acid 14 per cent in eighteen minutes.

According to Fellers (1936) canned fruits retain vitamin C very well, while canned vegetables lose much of their original ascorbic acid. Modern methods are directed to remedy this fault and prevent loss through oxidation. Canned, puréed vegetable baby foods tend to have slightly lower ascorbic acid content than the unstrained canned product.

Table 51 shows typical findings with canned products. In 1943 a new method was developed for sealing evaporated milk tins in an atmosphere of nitrogen or under vacuum. This increases the amount of ascorbic acid retained by 50 per cent after 6 months' storage.

TABLE 51.—**Percentage Retention of Ascorbic Acid in Canning Processes.***

Food items.	*Maximum*	*Minimum*	*Average*
Apricots	97	76	87
Asparagus	100	80	92
Grapefruit juice	100	90	96
Green beans	75	40	55
Lima beans	100	60	76
Orange juice	100	94	98
Peaches	91	59	71
Peas	90	45	72
Tomato juice	90	35	67

* Cameron, E. J., *et al.*: Am. J. Pub. Health **39**, 756, 1949.

Quick heating methods are preferable to slow ones since the greatest losses occur during the warming-up period which not only permits but accelerates oxidase activity. Prolonged simmering, of course, destroys the vitamin potency. High temperatures are conducive to extensive losses.

Electronic cooking or high frequency heating will be investigated more and more in the future. Like pressure cooking, the public is convinced without evidence that these newer procedures are better than older ones. When comparative testing is done, using the best

saucepan technic and following the directions for the pressure cooker variable results are obtained. Sometimes one is better, sometimes the other. In a series of experiments, the gains may be balanced out by the losses leaving one to the conclusion that, in general, it is six of one and half a dozen of the other. It all depends upon the net result from several factors: quantity of water, temperature and time. One can offset the other.

The modern trend toward barely cooking vegetables as compared to the overcooking of an earlier generation is all to the good. Meats, likewise, are cooked at lower oven temperatures. The minimum use of water and avoidance of open-kettle cooking, as well as the practice of waiting until the water is boiling before adding vegetables, are worthwhile practices.

Vitamin D.—Pasteurization, homogenization, and canning do not significantly lower the vitamin D potency in milk. There is little evidence that cooking is harmful. Loss in storage is not appreciable unless conditions are right for oxidation. All sources, including crystalline activated ergosterol and crystalline activated 7-dehydrocholesterol, as well as natural sources, are susceptible to destruction (Fritz *et al.*, 1942). Cereal carriers protect the vitamin D. Activity is quickly lost when the oil is exposed to adsorbent materials, as charcoal.

Vitamin E.—Inadequate data are available for commenting upon the stability of vitamin E to processing. One important fact stands out and that is the highly destructive action of rancid fats upon vitamin E.

TABLE 52.—Ascorbic Acid Content of Cooked and Canned Foods Compared to the Fresh Foods.*

Food items.	Raw.	Cooked. Solid.	Cooked. Liquid.	Method of treatment
	Mg. per 100 g. or cc.			
Apples	10.0	7.0	...	Sauce, boiled 4 min.
	10.0	6.0	...	Sauce, boiled 18 min.
	10.0	3.1–3.3	...	Baked, open dish, 1 to 1½ hrs., 204° C.
	10.0	2.6–3.4	...	Baked, covered dish, 1 to 1½ hrs., 204° C.
	10.0	2.2	...	Baked in pie
Asparagus	12.0	8.2	...	Boiled
		0	...	Canned
		2.8	...	Canned, strained
Tips	45.0–165.4	21.4–35.7	1.1–2.2	Boiled
	45.0–165.4	10.0–14.4	10.6–17.1	Canned
White stems	8.0–25.6	10.1–17.1	1.1–2.2	Boiled
	8.0–25.6	10.3–13.7	10.6–17.1	Canned
Green stems	23.7–71.7	19.5–39.8	1.1–2.2	Boiled
	23.7–71.7	13.1–32.6	10.6–17.1	Canned
Beans, broad	27.7	7.8	8.9	Boiled
Beans, green stringless	9.0–13.5	1.8–3.4	2.5–6.2	Boiled
	9.0–13.5	4.1–4.2	5.5–5.6	Canned
Beets	21.8	20.1	...	Boiled 1 to 2 hours, liquid rejected
	21.8	20.1		Boiled 1 to 2 hours, liquid kept
		13.2–19.2	...	Canned
Beet greens	43.0	25.0	4.0	Boiled 2 min.
	43.0	16.0	7.0	Boiled 6 min.
	43.0, 37.0	16.0, 16.0	9.0, 7.0	Boiled 10 min. (done)
	37.0	14.0	10.0	Boiled 14 min. (overdone)
Broccoli	32.0	22.0	...	Boiled
Brussels sprouts	115.0	33.3–36.6	16.2–23.4	Boiled
	79.0	43.8	...	Boiled 30 to 40 min., liquid rejected
	79.0	77.3		Boiled 30 to 40 min., liquid kept
	123.0	66.0	...	Boiled 15 min.
	123.0	29.0	...	As above, then 2 hrs. in cooking box
	123.0	24.0	...	As above, then 6 hrs. in cooking box
	123.0	87.0	...	Steamed 15 min.
	123.0	29.0	...	As above, then 2 hrs. in cooking box
	123.0	18.0	...	As above, then 6 hrs. in cooking box
	123.0	64.0	...	Cooked in cooking box 30 min.
	123.0	41.0	...	As above, then further 2 hrs. in cooking box
	123.0	33.0	...	As above, then further 6 hrs. in cooking box
	79.0	66.9	...	Cooked with minimum amount of water
Cabbage, *see also* pages 326, 338	15.0	12.0	...	Boiled
	22.0–30.0	11.0–16.0	0.9–1.2	Finely cut, brought to boil
	22.0–30.0	9.0–13.0	1.2–2.0	Finely cut, boiled 3 min.
		8.0–11.0	1.8–2.5	Finely cut, boiled 6 min.

* From Boas Fixsen, M. A.: Nutrition Abstracts and Reviews, 8, 299, 1938.

Food items.	Raw.	Cooked. Solid.	Cooked. Liquid.	Method of treatment
	Mg. per 100 g. or cc.			
Cabbage (cont.)		7.0–9.0	2.2–3.1	Finely cut, boiled 9 min.
		7.0–8.0	2.5–3.8	Finely cut, boiled 12 min.
	18.0	10.3		Boiled 30 to 40 min., liquid rejected
	18.0	15.5		Boiled 30 to 40 min., liquid kept
	18.0	0	.	Boiled 1 to 2 hrs., liquid rejected
	18.0	14.9		Boiled 1 to 2 hrs., liquid kept
Cabbage, red . .	57.3	32.7	. .	Boiled 30 to 40 min., liquid rejected
	57.3	58.4		Boiled 30 to 40 min., liquid kept
	57.3	40.9	. . .	Boiled 1 to 2 hrs., liquid rejected
	57.3	55.9		Boiled 1 to 2 hrs., liquid kept
Cabbage, Savoy .	56.7	12.9		Boiled 30 to 40 min., liquid rejected
	56.7	35.5		Boiled 30 to 40 min., liquid kept
	56.7	9.6	. . .	Boiled 1 to 2 hrs., liquid rejected
	56.7	24.3		Boiled 1 to 2 hrs., liquid kept
Carrots	1.2	3.6	. . .	Cooked
	4.8–8.0	4.3–9.5	1.4–5.6	Cooked
	4.8–8.0	3.1–4.1	3.9–4.7	Canned
		0	. .	Canned
		2.5	. . .	Canned, strained
Cauliflower . . .	23.8	6.5		Boiled 30 to 40 min., liquid rejected
	23.8	26.6		Boiled 30 to 40 min., liquid kept
	23.8	18.9	.	Cooked with minimum of water
Cherries, Royal Anne	2.1	2.1	. . .	Canned
Corn	7.6	5.1	. . .	Boiled 12 min. on cob
	9.0	8.0	. .	Boiled 4 min., whole kernels
	8.9	8.3	. . .	Boiled
	8.2	7.6	.	Boiled
	9.0	7.0	. . .	Home canned, cream style
	9.0	8.0	. . .	Home canned, whole kernels
Gooseberries .	27.6–47.0	17.8–28.5		Cooked
	27.6–47.0	11.4–23.5	13.9–21.0	Canned
Grapefruit juice .	. .	. . .	45.0–50.0	Canned, sweetened, tested at once
			39.0–46.0	Canned, sweetened, tested after 6 months
			34.0–41.0	Canned, sweetened, tested after 12 months
			45.0–54.0	Canned, unsweetened, tested at once
			40.0–48.0	Canned, unsweetened, tested after 6 months
			36.0–43.0	Canned, unsweetened, tested after 12 months
Greengage plums	5.0–6.5	2.4–4.4	<1.0–2.9	Cooked
	5.0–6.5	3.1–5.7	2.7–4.3	Canned
Kale .	155.0	36.0		Chopped, boiled 25 min.

Food items.	Raw.	Cooked. Solid.	Cooked. Liquid.	Method of treatment
	Mg. per 100 g. or cc.			
Kale (cont.)	155.0	20.0	...	As above, then 2 hrs. in cooking box
	155.0	14.0	...	As above, then 6 hrs. in cooking box
	155.0	51.0	...	Chopped, steamed 25 min.
	155.0	16.0	...	As above, then 2 hrs. in cooking box
	155.0	11.0	...	As above, then 6 hrs. in cooking box
Kohlrabi	37.6	8.9	...	Boiled 30 to 40 min., liquid rejected
	37.6	26.7		Boiled 30 to 40 min., liquid kept
	37.6	35.8	...	Cooked in minimum amount of water
Loganberries	38.8–48.4	22.1–24.2	25.8–26.7	Boiled
	38.8–48.4	31.0–46.9	26.7–35.2	Canned
Onions	8.9	3.1	...	Boiled
	9.7	5.6	2.3	Boiled
Orange juice	50.0	...	29.4	Canned
Orange marmalade, much peel	...	7.0–14.0		
Little peel	...	6.0, 6.5		
No peel	...	<1.0		
Parsnips	3.7	6.1		
Peas	14.0	8.1		
	17.4	13.7	...	Boiled
	23.0–24.0	11.0–15.0	...	Boiled
	22.7-31.2	6 7–10.0	5.2–7.4	Boiled
	22.7-31.2	8.1–19.9	11.0–17.8	Canned
Pineapple	5.9	5.4	...	Canned
Pineapple juice	31.0	...	7.0	Canned
Plums, red	4.6	2.9	2.3	Boiled
	4.6	2.5	2.2	Canned
Potatoes, white	8.9, 9.9, 13.3	8.6, 9.5, 12.8	...	Boiled, peeled
	12.6, 13.3	14.9, 12.8	...	Boiled, 35 min., 95° C., peeled
	12.6, 13.3	17.2, 14.1	...	Steamed 45 min., peeled
	5.8–9.5	4.1–5.9	...	Boiled. peeled
	5.8–9.5	4.4–6.7	...	Steamed. peeled
	5.8–9.5	4.8–7.9	...	Steamed, unpeeled
	13.0–27.0	14.0–16.0	...	Steamed 20 min., unpeeled
	13.0–27.0	10.0–14.0	...	Boiled 20 min., peeled
	13.0–27.0	7.0	...	As above, then 2 hrs. in cooking box
	13.0–27.0	1.0–2.0	...	As above, then 6 hrs. in cooking box
	12.6, 13.3	12.2, 11.5	...	Cooked in pressure cooker
	12.6, 13.3	22.0, 17.0	...	Greased and baked 1 hr. 225° C.
	12.6, 13.3	6.8, 9.4	...	Cooked, then fried in butter in slices
	12.6, 13.3	13.4, 11.8	...	Fried in butter in strips
	13.3	13.7	...	Fried in Crisco in strips
Potatoes, new	29.1–40.6	18.5–25.0	1.8–4.9	Boiled
	29.1–40.6	19.3–21.9	11.5–25.0	Canned
Potatoes, sweet	...	8.0–12.0	...	Cooked in skins
Raspberries		5.0–8.0	3.9–8.1	Canned
Rhubarb	11.7	3.2	...	Cooked
	11.7	1.6		Canned
Sauerkraut	8.8	2.3	...	Cooked in minimum amount of water 30 min.
Spinach	18.0	13.0	...	Boiled

Food items	Raw.	Cooked. Solid.	Cooked. Liquid.	Method of treatment.
	Mg. per 100 g. or cc.			
Spinach (cont.)	78.3	29.7	. .	Boiled 30 to 40 min., liquid rejected
	78.3	48.9		Boiled 30 to 40 min., liquid kept
	32.0–46.9	12.1–23.7	12.1–21.4	Canned
Squash, Hubbard	3.1	4.1	. . .	Cooked
Strawberries	71.4	37.5	25.0	Boiled
	71.4	35.7	20.8	Canned
	64.6–77.5	40.8–55.4	16.3–18.4	Canned
Tomatoes	17.0–22.0	14.0–21.0		Canned, tested after 24 hrs.
	17.0–22.0	7.0–18.0	. .	Canned, tested after 6 months
		12.9–13.7	. . .	Strained
Tomato juice	15.7	. . .	24.2	Canned
			5.4–23.0	Canned
Turnips	35.0	18.0 . . .		Boiled

CHAPTER 11.

VITAMIN TABLES AND GLOSSARY OF VITAMIN TERMS

Introduction.—For normal development and growth, for maintenance of full health and for production of hardy off-spring, certain agents apart from carbohydrates, fats, proteins and minerals are required in the diet. Among these essential food factors are vitamins which occur in Nature in minute amounts.

With beginning recognition of these agents, it was customary to express the vitamin content of foods by use of letters, as G for good, or by employing plus or minus signs. Everyone looked forward to the day when vitamins could be designated in conventional units, as milligrams per unit weight. More and more methods have been devised to make this possible. As a result a considerable volume of numerical data on vitamins is available. These tabulations present frequent conflicts, a food by methods used in a given year in one or more laboratories showing a fair concentration of a specified vitamin and yet appearing at a later date to have no such vitamin content. Likewise, foods placed in the "nil" class in some sets of figures may feature satisfactory concentrations in other tables. Even under precisely controlled conditions various samples of a selected food may reveal widely separated vitamin values. One is tempted to ask what it all means.

It is the opinion of the compiler of the estimated values shown in the following tables that one should regard vitamin content as "subject to change without notice". The average person who deals with the practical aspects of diet-making is better off with vitamin tables composed of plus signs or letters which indicate the general class into which the specific food probably falls with respect to a particular vitamin. Then, there is little opportunity to calculate too closely. With numerical values, however, the person unfamiliar with problems of vitamin assay almost always leans the whole weight of a decision upon these figures. Such dependence and trust is misplaced, largely because humanity has too great a respect for figures *per se.*

Consistency would require that a generalized table minus all numbers accompany these remarks. Unfortunately, nobody would consult such a table when figures were to be had in other works. Such a table, found in previous editions, is in fact deleted. In bowing to modern styles in vitamin tables, we can do no more than warn against their unfair use in evaluating either a single food or a whole diet.

NUMERICAL VALUES FOR THE VITAMIN CONTENT OF COMMON FOODS.

The data herein assembled comes from many sources chief of which are:

BOAS-FIXSEN, M. A. B. and ROSCOE, M. H.: Tables of Vitamin Content of Human and Animal Foods. Nutr. Abstr. and Rev. **7**, 823, 1938; **9**, 795, 1940.

BOOHER, L. E., and HARTZLER, E. R.: The Vitamin B_1 Content of Foods in terms of Crystalline Thiamine, U.S. Dept. Agric., Tech. Bull. No. 707, Washington, 1939.

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DANN, W. J. and HANDLER, P.: The Nicotinic Acid Content of Meat, Jour. Nutr. **24**, 153, 1942.

EMMERIE, A., and ENGEL, C.: The Vitamin E Content of Foods, Ztschr. Vitaminforsch. **13**, 259, 1943.

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MUNSELL, H. E.: Vitamins and Their Occurrence in Foods, The Milbank Memorial Fund Quarterly **18**, 311, 1940.

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SULLIVAN, R. A., BLOOM, E., and JARMOL, J.: The Value of Dairy Products in Nutrition, Jour. Nutr. **25**, 466, 1943.

TEPLY, L. J., STRONG, F. M., and ELVEHJEM, C. A.: The Distribution of Nicotinic Acid in Foods, Jour. Nutr. **23**, 417, 1942.

THOMPSON, M. L., CUNNINGHAM, E., SNELL, E. E.: Nutritive Value of Canned Foods in Riboflavin and Pantothenic Acid, Jour. Nutr. **28**, 123, 1944.

Tables of Food Composition in Terms of Eleven Nutrients. U. S. Dept. Agric. Misc. Publ. No. 572, 1945.

Permissible Use of Tabulated Data.—There is no scientific justification for listing the day's menu, calculating the vitamin content from tables, and adding the figures together to obtain the total intake. The values shown in the table should be employed in judging whether or not a given food contributes a significant amount of specific vitamins to the diet. The table also permits intelligent selection of suitable sources of the desired vitamins. The variability between samples of the same food frequently is marked. Milk, for example, has been found to vary from 100 to 400 I.U. of vitamin A per 100 grams and butter from less than 1000 to more than 6000 I.U. It must be stressed that the figures shown in the tables are representative rather than averaged values.

Quoting from the extensive review of Munsell, "It is desirable to have a set of values showing the quantities of the various vitamins in different foods. In the general discussion of food sources of the vitamins it was made clear that no food has a fixed and invariable content of any vitamin. Values for different samples of any food may vary over wide ranges depending upon the factors that influence the content of the vitamins it contains." For practical dietetic purposes an intelligent selection of representative data becomes necessary. "Some values in the table may differ materially from corresponding ones in other summaries. Too much concern should not be felt over such discrepancies, perhaps, since all values of this kind are, as explained, arbitrarily selected and their approximation to actual fact is problematical in any case."

TABLE 53. **Occurrence of Fat-soluble Vitamins in Some Foods.**
(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg.)*	*Vitamin K*
Alfalfa leaf meal, dry	8000			xx
Almonds	0–75			
Apples	50–90			
Sauce, canned	60			
Apricots	2790–4000			
Canned	1350			
Dried	5000–7430			
Artichokes, globe	200–390			
Asparagus, green	700–1400			
Bleached	0–50			
Canned	600			
Cooked	960			
Avocados	100–290			
Bacon	0			
Bamboo shoots	22			
Banana	300–430			
Banana powder	750			
Barley	0		3.2–5.2	

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg)*	*Vitamin K*
Beans, green, cooked:				
Kidney	900			
Lima	280			
Canned	130			
Snap	630–2000			
Canned	410			
Soy	200–350			
Wax	350			
Beans, dried, cooked:				
Kidney	0		1.2	
Lima	0–100			
Navy	0		4.0	
Soy	100			xxx
Baked with tomato	70			
Beef, lean	20		x	Trace
Beet tops	6700–21,000	Nil		xx
Beets	0–20		0.2	
Blackberries	75–150			
Black currants	400			
Black-eye peas—*see* Cowpeas				
Blueberries	50–280			
Brazil nuts	10			
Bread, "brown"	0		2.1	
White	0		1.4	
Fortified		x		
Broccoli, entire plant	9000	Nil	xx	xx
Cooked, flowers	3000–5000			
leaves	7300–16,000			
stem	1000			
Brussels Sprouts, cooked	400–640		1.7	x
Butter, average	3300	80	2.1–3.3	Nil
summer	up to 20,000	150		
Butter, goat's	900			
Cabbage:				
Young, partly green	150			
Green, cooked	80–170			x
Mature, white	0		0.7	
Red	40		0.2	
Dehydrated, unsulfited	520			
Cantaloupe	300–3400			
Carrot tops	xxx	Nil	xx	xxx
Carrots, cooked	10,000–12,000		1.5	
Canned	12,000			
Dehydrated	117,000			
Cauliflower	30–90			
Celery cabbage	9000			xx
Celery, green	1000		2.6	
Bleached	0–10			
Chard	2800–14,500	Nil	xx	xx
Cheese:				
Camembert	3610			
Cheddar	1200–2000			
Canned	1260			
Cottage, skim milk	60–175			
Cream	2000–2210			
Kraft, Amer.	[illegible]			
Eng.	[illegible]			
Parmesan	900			
Roquefort	2500–4000			
Swiss	1970–2700			
20% fat			0.6	
10% fat			0.3	

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg.)*	*Vitamin K*
Cherries	15-800, av. 150			
Chestnuts, fresh	80			
Chicken	0			
Chick peas	Trace			
Chili con carne, plain, canned	160			
Chives	500			
Chocolate, milk	480			
Sweetened	36			
Unsweetened	60			
Clams	14-200			
Cocoa powder, breakfast type	26		3.1	
Medium fat	17			
Cocoa fat			12.5	
Cocoanut, dry	0			
Coconut oil		Nil	3.0	
Cod	0	52		Nil
Cod-liver oil	85,000†	8500†	0	Nil
Collards	7000-12,200			
Corn, sweet, white	0-50			
Yellow	390-600			
Canned	200			
Corn, dried	330-550		10.0	
Cornmeal, white	0			
Yellow, degerminated	300			
Whole	510-750			
Corn oil, refined	0	0	104-110	Nil
Cottonseed oil, refined	0	0	83-92	Nil
Cowpeas	0-30			
Cranberries	20-70			
Sauce, canned	30			
Dehydrated	660			
Cream, 20%	600-830	Traces		
Summer	1640			
Cucumbers, pared	0-Trace			
With skin	260			
Currants, black	400			
Red	120			
Dandelion greens	9000-13,650	Nil	xx	xx
Dates, cured:				
Unprocessed, Deglet Noor	0			
Processed, Saidy	350			
Dock, leaves	14,000	Nil	xx	xx
Eel	660-18,500	474		
Egg, whole, fresh	1140		3.0	
dried	4460			
yolk, fresh	3210	Trace-xx	x	x
Summer	3760			
Winter	1880			
white, fresh	0	Nil		
Eggplant	30-100			
Endive, escarole	10,000-15,000	Nil	2.0	xx
French chicory	4000		0.2	
Farina	0			
Figs, fresh	10-50			
dried	60-115			
Fish liver oils	xxx	xxx	0	0
Flour:				
Rye	0			
Soy, low fat	70			
med. fat	110			
full fat	140			
Wheat	0			

† Consult label on product.

(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg.)*	*Vitamin K*
Flour: Wheat 70% extraction	0		1 7	
82% extraction	0		2 7	
Whole-grain	0		1 2-3 4	
Germ	0		27 0	
Gooseberries	380			
Grapefruit	0 20			
Grapes	0 80			
Green vegetables	xx	Nil		xx
Leafy	xxx	Nil	xx	xxx
Guavas	200			
Hazelnuts	100			
Heart, fresh	0-200			
Herring, fresh		xx		Nil
Canned	98-210			
Hominy	0			
Honey	0			
Honey dew melon	50			
Ice cream, plain	540			
Kale	7500 20,000	Nil	8	xxx
Kidney, beef, cooked	1150			
Kippers		xx		Nil
Kohlrabi	2500			
Lamb, lean	0-Trace			
Lambsquarters	19,000			
Lard	0 5	0	0	
Leeks	1000		1.9	
Lemons	0			
Lentils, dry, cooked	50			
Lettuce, headed	540			
all others, aver.	1620			
green	4000 5000			
bleached	100		0 6	
Romaine or cos	1000			
Limes	0			
Liver, fresh	19,200-30,000	15-45		x
Mackerel, canned	175-215	xx	165-250	Nil
Mango	1000 1500			
Margarine, with added A	3300	x	x	
Marmalade, orange	5			
Marrow, vegetable	30			
Milk, breast		3		
After use of vitamin D milk		6		
Milk, cow's:				
Whole, fresh, aver. market	120	2	Trace	
From cows on dry feed	60	1		
From cows on pasture	180	3		
Canned, evaporated	400	3		
Irradiated		28+		
Fortified, pasteurized		40+		
Irradiated, pasteurized		14+		
Metabolized (yeast), certified		40+		
Dried, average	960	16		
From cows on dry feed	480	8		
From cows on pasture	1440	24		
Skim	10			
Dried	20			
Molasses	0			
Multi-Purpose Food	1667	133		
Mushrooms	0			
Grown in dark		21		
Grown in light		63		
Muskmelons	2400			
Mustard greens	6400-11,000	Nil	xx	xx

* Excellent **xxx**, Good **xx**, Fair **x**.

(Estimated per 100 grams moist weight.)*

Food items.	Vitamin A (I.U.)	Vitamin D (I.U.)	Vitamin E (mg.)	Vitamin K
Nectarines	2800			
Noodles, egg	200			
Oatmeal	0		2	
Okra	400 2400			
Olive oil	20	Nil	3-8	
Refined	0			
Olives, green	200			
Ripe	125			
Onions, green	5000		0.2	
Mature	0-50			
Dehydrated	20			
Oranges	190			
Juice	100			
Oysters	140-210	5		
Papaya	2500 3000			
Parsley	5000 30,000	Nil	5.5	x
Parsnips, cooked	0			
Peaches, white	5 100			
Yellow	880 2000			
Dried	3000 3250			
Canned	450			
Peanut oil	0	Nil	xxx	
Peanuts, roasted	0		26-36	
Pears	10 30			
Canned	Trace			
Pea soup, dehydrated	220			
Peas, fresh, cooked	680		6	x
Dried, green	530			
Dried, split	370			
Pecans	50 400			
Peppers, green	3000			
red	2000			
Persimmons	2600			
Pickles, cucumber	190			
Pineapple	150			
Juice	125			
Canned	100			
Plums	350			
Popcorn	500			
Pork	0			
Potato chips	80			
Potatoes	20-40		0.1	
Prunes, fresh	1500			
Dried	1600-2500			
Canned	230			
Pumpkin, cooked	1200 3400			
Canned	3400			
Radish	30			
Raisins	0			
Raspberries, black	0			
Red	130			
Red palm oil	xxx		110	
Rhubarb	100			
Rice, white	0		0.4	
Roe	2000			
Rutabagas, white	0			
Yellow	25			
Rye	0		2.2-3.5	
Salmon, Canned	60	500		
Chum	30	225		
Chinook	750	275		
Pink	100	625		
Red	325	800		
Sardines, canned in oil, drained solids	290	250–333		

(Estimated per 100 grams moist weight.)*

Food items.	Vitamin A I.U.	Vitamin D (I.U.)	Vitamin E (mg.)	Vitamin K
Sardines, canned in oil, total contents	710	333		
Sauerkraut, canned	Trace			
Scallops	0			
Shrimp, canned	60	xx		
Soya oil			92 120	xx
Soybean sprouts	170			
Spinach	8400 25,000	Nil	1.7	xxx
Canned	6790			
Squash, summer	250 1000			
Winter	4000 6000			
Strawberries	60			
Succotash	400			
Suet, beef	600			
Sugar	0			
Sweet potatoes	3500 7700			
Dehydrated	21,900			
Swordfish, fresh	1595			
Tangerines	300 420			
Tomato, mature, green	800			xx
ripe	1000			x
Ketchup	270 1880			
Pureé	1880			
Tuna fish, canned, drained solids	70	<100 333		
Tuna fish, canned, total contents	130	<100 333		
Turnip greens	10,000 20,000	Nil	xx	xx
Turnips, white	0		0 02	
Yellow	20			
Walnuts, black	70			
English	50			
Watercress	4000			
Watermelon	50			
Wheat	0			
Wheat germ	0			
Wheat germ oil, crude			150-420	
medicinal			320	
Yeast	0			

* Excellent xxx, Good xx, Fair x.

TABLE 51 Representative Values for the Chief Water-Soluble Vitamins in Some Foods.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	Thiamine (Micrograms)	Riboflavin (Micrograms)	Nicotinic Acid (Milligrams)	Ascorbic Acid (Milligrams)
Almonds	255	300 670	5	0
Apples	45	10 50	0	1 5-20 (av. 5)
Apple juice	20	30	0	3
Pie	27	32	0	4
Applesauce, canned	10	10	0	1
Apple nuggets, dry	50	80	Trace	11
Apricots, fresh	30-45	40 75	<1	4 11
Canned	20	24	Trace	4
Dried, sulfured	10	160	3	12
Unsulfured	90	100		2
Arrowroot		60		
Artichokes, globe	75-180	30		10
Jerusalem	60 150			6

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Asparagus, green	180–210	120	1	35
Canned	60	90	1	15
Bleached	150–180	x		32
Canned		60		
Avocados	90–120	90–150	1	10–16
Bacon, lean	270	150	2	0
Medium fat	420	100	2	0
Canned	260	100	1.5	0
Bamboo shoots	54	x	0	6
Banana powder		300		2.5
Bananas	50–90	60–75	<1	10
Barley	500	120		
Pearled	120	80	3	0
Beans, snap:				
Green	80	100	<1	19–25
Canned	30	50	Trace	4
Wax	75	100		25
Beans, shelled, green:				
Kidney	210	95	<1	28
Lima	250–300	140–175	1	32
Canned	30	50	<1	8
Soy	470	300	1	30–40
Beans, dried:				
Kidney, navy	450–600	240–325	2	0
Lima	525	750		0
Soy	1140–1200	310–750	2	0
Soy sprouts	100	120	1	14
Beans, baked	120	100	1	0
Canned	50	50	<1	
New England style		54		
With tomato sauce		24		4
Bean soup, dehydrated	460	220	2.4	1
Beef, fresh:				
Chuck	120	150	5.0	0
Hamburger	100	130	4.3	0
Loin steaks	100	130	4.6	0
Rib roast, steaks	110	140	4.7	0
Round steak	120	150	5.2	0
Rump	100	120	4.2	0
Soup meat	130	160	5.5	0
Stew meat	100	120	4.3	0
Tongue, med. fat	220	270	5.0	0
Beef, processed:				
Corned, med. fat	50	100	1.7	0
Canned	20	190	2.7	0
Hash, canned[1]	20	130	2.4	0
Hash, canned[2]	40	110	2.5	6
Dried, chipped	110	220	3.7	0
Roast, canned	20	240	4.5	0
Beef and gravy	90	190	2.7	
Chili con carne, plain, canned	10	100	2.1	0
Stew, canned[3]	40	120	2.4	0
Beet tops	50	170–300	0.3	34–50
Beets, canned	10	30	0.1	5
Blackberries	30–45	60		10
Black currants	30	140		150
Black-eyed peas—*see* Cowpeas				
Blueberries	30–45	70	0.3	10–15
Bluefish	x	200		0
Bologna	310	300	3.0	0

[1] Cont. 72% beef, 28% potatoes.

[2] Cont. 50% meat, 48% potatoes, 2% onions.

[3] Cont. [illegible]% meat, 15% potatoes, 15% carrots, 8% dry beans, 1% tomato puree

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Bouillon cubes	30	83	0.6[4] up to 27[5]	0
Brazil nuts	500-1100	70		0
Bread:				
Rye, light	160	40	1.1	0
White	45-90	50-90	1	0
Enriched	240-400	150-350	2-3	0
Whole wheat	225-450 (av. 280)	140-180 (av. 150)	3.5	0
Broccoli, entire plant	130	250	0.9	70-110
Cooked				22
Flowers	135	240		100
Leaves	135	450		125
Stems	75			
Brussels sprouts	110-180	60-75	0.3	65-150
Buckwheat	450		4	0
Butter	0-120	10-37	0.1	0
Buttermilk, cultured	40	180	0.1	1
Butternuts	xx			0
Cabbage:				
Young, partly green	30	50		60
Mature, bleached	30	25	0.5	60
Red				60
Green, boiled 10 min.				40
" 15 "				29
" 30 "				22
" 60 "				15
" 90 "				5
" 120 "				1.5
Dehydrated[6]	410	370	2.4	189
Cake, light batter	30-55	100-150	0.7	0
Candy, average	80	140	4	0
Cantaloupe	50-60	40-75	0.8	30-42
Carp		40		
Carrot juice				4
Carrots	60-70	60	0.5	6-10
Canned	30	20	0.3	2
Dehydrated	290	280	3.2	11
Cashew nuts	150	190		0
Cauliflower	100-150	105-130	0.6	69-75
Cooked	90			30
Celery	30	40	0.3	5-7
Bleached		35		
Green		100		
Celery cabbage	30	45		45
Cereals, prepared—refer to package label.				
Chard	60	130	0.2	38
Cheese:				
Amer., processed, canned	30	430	0.1	0
Camembert		830	1.6	
Chantelle		470	Trace	
Cheddar	24-40	500-550	0.2	0
Cottage	20	290	0.1	0
Cream	10	140	0.1	0
Parmisello		710	0.1	0
Processed (Old English)		570	Trace	0
Roquefort	30	450	1.2	0
Swiss	30	370	Trace	0
Velveeta		550	0.1	0

* Excellent xxx, Good xx, Fair x.

[4] vegetable extract.

[5] meat extracts.

[6] If sulfited, thiamine value appreciably lowered, ascorbic acid about doubled

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Cherries	50	40		10
Canned	30	20	0.2	3
Chestnuts, fresh	240-270	x	1	6
Chicken	90-150 (av. 110)	70-260 (av. 180)	8.6	4
Boned, canned	10	150	3.7	2
Chick peas	350	150	1.4	2
Chile con carne, plain, canned	10	100	2.1	0
Chives	120			70
Chocolate, milk	50	290		0
Sweetened	14			
Unsweetened	42	240	1.1	
Clams	20	120	1	30
Cocoa, breakfast type	67	390	2	0
Med. fat	75	390	2	0
Beverage, made with milk	75	230		0.9
Cocoanut, fresh	30-60	100	<1	
Dried	Trace	Trace	Trace	0
Cod	40-90	50	2.3	2
Roe	xxx	xxx		
Liver	270			
Cod-liver oil	0	0	0	0
Coffee	900	70	10	0
Beverage			<1	
Collards	80-220	200-300	0.8	60–100
Cookies, plain	40	40	0.5	0
Corn, sweet, white or yellow	150	60-140	1.4	12
Canned	20	50	0.8	5
Dried	300	x		0
Corn cereals—refer to package label.				
Cornmeal, white, degerminated	160	90	0.9	0
Whole-grain	410	120	1.7	0
Cornmeal, yellow, degerminated	150	60	0.9	0
Whole-grain	450	170	2.1	0
Cornstarch	0	0	0	0
Corn syrup	0	10	0.1	0
Cottonseed oil	0	0	0	0
Cowpeas, fresh				6
Dried	500–830	230-300	2.2	2
Crabmeat	90–140	350	3	13
Cracker meal	70	0	0.6	0
Crackers, Graham	300	120	1.5	0
Soda	100	30	<1	0
Cranberries	30	x		15
Dried	190	180	0.9	33
Cranberry sauce, canned		40		
Cream, 20%	30	140	0.1	1
Cream pie	30	80	0.2	0
Cucumber pickles	10	20	Trace	7
Cucumbers	30-40	25-90	0.2	8
Currants, black	30	140		150
Red	45			45
Dandelion greens	190	140	0.8	35-100
Dates, cured	75	45-100	2	Trace
Doughnuts	280	220	2	0
Duck	360	230	3	8
Eel		60		
Egg, hen's:				
Whole, fresh	120-150	340	0.1	0
dried	350	1230	0.2	0
White	0 Trace	250		0
Yolk, fresh	320	520		0
Eggplant	45-70	30-60	0.8	5–10
Elderberries				10

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Endive, escarole	50 84	120 200		15
French	75	60		20
Farina . .	60	60	1	0
Enriched .	370 530	260-270	1 3	0
Fig bars	20	60	0 9	0
Figs, fresh	60-75	5 45	<1	2
Dried . .	66	75	2	0
Fish, aver. lean	90-180			
Med. fat	70	70	4.2	2
Flour:				
Buckwheat, light	310	80	2 1	0
Whole-grain	610	160	4 2	0
Rye, light	150	70	0.9	0
Whole-grain	470	210	1.7	0
Soy, low fat	1100	350	2.9	0
Med. fat	820	340	2.6	0
Full fat	770	280	2 2	0
Wheat, patent	70	30	0.8	0
Enriched, min.	440	260	3.5	0
Enriched, max.	550	330	4.4	0
Wheat, peeled	580			
Self-rising .	20	20	0.7	0
Enriched	440	260	3.5	0
Stone-ground .	480			
Stone-ground, white .	270–330			
Whole	560	120	5.6	0
Frankfurters . . .	190	230	2.4	0
Fruit cocktail, canned	10	10	0.4	2
Garden cress	90			
Garlic	150	4		14
Goose	150	xx	3	xx
Gooseberries	150			25
Grapefruit	40–72	20–40	0.2	43
Juice .	50–75	30		41–45
Canned . .	30	19	0.2	35
Segments, canned	30	21	0.2	30
Grapes	45-50	15-40	0.4	4
Juice	30	30	0	2–6
Dried, unsulfured	150	80	0.5	Trace
Guavas .	45–150	10 90	1	75-250
Haddock	15–120	160	1	0
Halibut .	90–120	180	6	0
Ham, fresh .	960	190	4.1	0
Smoked	780	190	3.8	0
Ham and eggs, canned[7]	160	240	1.7	0
Hash—*see* Beef, corned				
Hazelnuts (filberts)	400-660	xx		0
Heart, fresh:				
Beef	600	900	6.8	14
Lamb .	600			
Pork	540		8	
Herring .	120	310	4	0
Hickory nuts	600	xx		0
Hominy, white	150-180	50-60	0.9	0
Honey	0 6	0-40	0.2	0-4
Horseradish	70			90
Huckleberries				40
Ice cream, plain	24 40	150–190	0 1	Trace
Jams	20	20	[illegible]	[illegible]
Jellies	20	20	0 2	4
Kale	120 190	350 500	0 8	100 150
Ketchup, tomato	120	70	2	11

[7] 50% each.

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine* Micrograms	*Riboflavin* Micrograms	*Nicotinic Acid* Milligrams	*Ascorbic Acid* Milligrams
Kidney:				
Beef or veal	250	2100	10	11
Lamb	300	2000		
Pork	500	2100		
Lamb:				
Leg roast	210	260	5.9	0
Shoulder roast	180	230	5.2	0
Sirloin chops	210	260	5.9	0
Lambsquarters	x	x		85
Lard	0	0	0	0
Leeks	80-150	x		15-20
Lemonade	8			5
Lemons	40-60	5	0.1	45
Juice	30	Trace		45
Lentils, dried	500	315-400	3	0
Lettuce, headed	60-75	45-70	0.2	8
All other	60-75	70-150	0.2	18
Limes	30-60	5	0.1	27-37
Liver, fresh	270-400	2500-3300	16.1	31
Sausage	170	1120	4.6	0
Lobster	150	130		5
Loganberries	33			35
Loquats				2
Luncheon meat, canned	290	210	2.7	9
Macaroni	130	80	2.1	0
Mackerel, Atlantic	58	200	5.8	0
Pacific	26	330	8.7	
Roe	xxx	xxx		
Mango	60-90	50-100		25-60
Margarine	0	0-6	0	0
Marmalade, orange	20	20	0	7
Marrow, vegetable	30-60			11
Mayonnaise	40	40	0	0
Melons, honey dew	46		0	21
Cantaloupe	60	40-75	0.8	33-42
Milk, cow's:				
Whole, fresh, aver. market	42	195	0.1	Raw 2.2 Past. 1.3
From cows on dry feed	42	160		
From cows on pasture	42	210		
Whole, condensed	50	390	0.2	1
Evaporated	50	360	0.2	1
Dried	300	1500	0.7	6
Skim, fresh	45	200	0.1	1
Dried	350	1960	1.1	7
Milk, miscellaneous:				
Buttermilk, cultured	40	180	0.1	1
Chocolate flavored	30-40	160-180	0.1	<1
Goat	60	40-80		1.5
Human	15-20	16-52	0.2	6
Molasses	0-80	0-160	2.8-4	0
Multi-Purpose Food	400	670	4	
Mushrooms	60-120	5-500	6	1-8
Mustard greens	90-140	200-370	0.8	100-180
Nectarines	72			25
Noodles, egg	180	110	2.1	0
Oatmeal	540-810	100-150	1.1	0
Okra	120	100	0.7	20-30
Olives, green	8	x	0	0
Ripe	6	0		0
Onions, green				20-30
Mature	30	20-60	0.1	9-15
Dehydrated	230	150	1.1	37
Oranges	80	30-60	0.2	49

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Orange Juice	70	15		45
Canned	70	20	0.2	42
Oysters, solids and liquor	180-300	230-460	1.2	Trace-3
Papaya	50-75	150-180		45
Parsley	80	300		100-140
Parsnips	80-120	90	0.2	18-30
Peaches	20-40	50-60	0.9	8-10
Canned	10	20	0.7	4
Dried, sulfited	10	200	5.4	19
Peanut butter	200-300	160-320	16.2	0
Peanuts, roasted	300-400[8]	160-500	16.2	0
Pears	20-45	20–75	0.1	4-7
Canned	10	20	0.1	2
Pea soup, dehydrated	620	210	3.1	2
Peas, green	400	200	2.1	25
Canned	110	60	0.9	8
Split	870	290	3.0	2
Pecans	500	300	0.9	2
Peppers, green	30-70	40-100	0.4	120-180
Red	30-70			150
Persimmons	0			100
Pickles, cucumber	10	20	Trace	7
Pineapple	80-90	5-55	0.2	24-38
Canned	70	20	0.2	9
Juice, fresh	65			25
Canned	50			9-15
Plums	50-150	30-45	0.6	5-7
Canned (Italian prunes)	30	30	0.4	1
Pomegranate juice		100		7
Popcorn, popped	x	x	1	0
Pork:				
Bacon—*see* separate entry.				
Boston butt	1050	210	4.5	0
Ham—*see* separate entry.				
Lean cuts, misc.	920	180	3.9	
Loin	1040	200	4.4	
Picnic	940	180	4.0	
Pork and gravy, canned	190	240	2.7	
Sausage	220	150	2.3	
Bulk, canned	190	210	2.8	
Salt, fat	180	40	0.9	
Spareribs	920	180	3.9	
Potato chips	350	210		15
Potatoes, aver.	100	40	1.2	10
New				16
Stored, old				5
Newly dehydrated	250	100	4.8	26
Prunes, fresh	50			
Dried, unsulfited	100-180	160	1.7	Trace
Pumpkin	50	80	<1	3-10
Canned	20	60	0.5	0
Quince				9-12
Rabbit	90	60	7	4
Radishes	40-60	30-40	0.1	25
Raisins, unsulfited	150	80	0.5	Trace
Raspberries	20-30	70	0.3	30
Juice	20			20
Rhubarb	10-25	30	0.1	15-20
Cooked				3
Rice, brown	290	50	4.6	0
Converted	230	40	3.8	
White	50	30	1.4	

* Excellent xxx, Good xx, Fair x.

[8] Tested without skins, with skins higher.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Roe	1000	100		5
Rolls, plain, enriched	240	150	2.	0
Rolls, sweet, not enriched	80	130	0 8	
Rutabagas	60–75	60–100	0 5	36-45
Rye	500	140		
Salmon	30–120	160–220	7.4	9
Canned	30	160–180	6.5	0
Salsify				7
Sardines, Atlantic, canned in oil, drained solids	15	190	4 8	0
Sardines, Pacific, canned in oil, drained solids	7	300	7.4	
Sardines, Pacific, in tomato juice	10	330	5 8	
Sauerkraut, canned	30	200	0.2	8–18
Scallops	xx	x	1	3
Shredded Wheat	200	140	4.2	0
Shrimp	90	160	1	3
Canned	10	30	1.9	0
Soy—*see* Beans and Flour.				
Spaghetti with meat, canned	20	120	2 2	
Spaghetti	130	80	2.1	0
Spinach	50–120	240–300	0.7	59–75
Canned	20	80	0 3	14
Squash, summer	40	50	1.1	17
Winter	50	80	0.6	8
Strawberries	30	70	0.3	60
Succotash	90	100		8
Sugar	0	0	0	0
Sweet potatoes	100–140	60-75	0 7	22–33
Dehydrated	180	140	1.9	34
Swordfish	53	49	9 1	
Syrup, table	0	10	0 1	0
Tangerines	70–120	20-30	0.2	30–48
Taro	90	xx		10
Tea	0	350	7	0
Beverage			<1	
Tomato catsup	90	70	2.2	11
Puree	90	70	1.8	28
Tomatoes, fresh	60 80	40–60	0.6	23
Green (mature)	70	45		13-30
Ripe	75	60		13–30
Canned and juice	50–80	40–45	0.7	7–29
Tongue, fresh, med. fat	220	270	5	0
Tripe	6	120	3	
Tuna fish, canned, drained solids	40	130	10.6	0
Tuna fish, canned, total contents	40	110	9.2	0
Turkey	120-150	190-240	7.9	
Turnip greens	100	350–560	0 8	100–140
Turnips	60	60	0 5	30
Cooked				18
Veal:				
Chops, loin	180	270	6 3	0
Cutlet, round	180	280	6 4	
Roast or steak, leg	170	270	6 3	
Stew meat	170	260	6 0	
Vienna sausage, canned	70	140	3.1	0
Walnuts, black	330			
English	480	130	1 2	3
Watercress	120	250	1	60 75
Watermelon	30–60	15 50	0 2	6
Wheat—*see also* Flour.				
Whole-grain, uncooked	450	130	4 6	0
Bran	370-520	350 600	32	0
Germ	2050–3500	480 1500 (av. 800)	4.6 7	0

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	Thiamine (Micrograms)	Riboflavin (Micrograms)	Nicotinic Acid (Milligrams)	Ascorbic Acid (Milligrams)
Whey, dried	1100	5900		0
Whitefish	90	xx		
Yeast, compressed baker's	450	2070	28.2	0
Dried, brewer's	9690	5450	36.2	

* Excellent xxx, Good xx, Fair x.

TABLE 55.—Occurrence of Minor Members of the Vitamin B Complex in Some Foods.

(Estimated in micrograms per 100 grams of moist weight.)

Food items.	Pyridoxine	Pantothenic Acid	Biotin
Apples	26	60	0.9
Apricots, canned		90	
Artichokes, Jerusalem		400	
Asparagus, canned:			
All green		165	
Bleached		105	
Bananas	320	70-180	4.4
Barley		1000	
Beans, green, canned		55	
Lima, green, canned		95	
Navy, canned:			
New England style		70	
With tomato sauce		85	
Dried	550	830	9.8
Beef brain		1800	
Heart	120	2000	
Liver	170	4000-7600	
Muscle	77	490	2.6
Beef, lean		1000	
Beets	110	110	2.7
Canned		66	
Bread, white		460	1.1
Whole wheat		570	1.9
Broccoli		1100-1400	
Buttermilk, churned		350-560 (av. 460)	
Cabbage	120	180	2.4
Carrots	120	200–250	2.5
Canned		115	
Cauliflower	20	920	17.0
Cheese	66	130-960	3.6
Chicken		530–620	5.4-9.8
Breast	130		
Leg	25		
Chocolate	23	190	32.0
Corn		310	5.8
Yellow, whole kernel, canned		180	
White, whole kernel, canned		160	
Cornmeal, white	54		
Cowpeas		1700-2000 (av. 1800)	
Egg, hen's	22	800-4800 (av. 2700)	9.0
Egg-yolk		5000-10,000 (av. 6300)	
Grapefruit	9	290	3.0
Canned, juice		100	
Segments		110	
Halibut	110	150	8.0
Lamb, leg	81	600	2.1

(Estimated in micrograms per 100 grams of moist weight.)

Food items.	*Pyridoxine*	*Pantothenic Acid*	*Biotin*
Lettuce		110	3 1
Kale		300	
Mackerel, canned:			
Atlantic	210	310	3 0
Pacific	270	470	18 0
Milk, fresh, whole	6	130-420 (av. 200)	5 0
Skim		210-430 (av. 360)	
Dried	50		
Molasses	270	260	9 1
Mushrooms	45	1700	16 0
Mutton, shoulder	18	4300	2 7
Oats, rolled		1100	
Oranges	80	70 340	1 9
Juice, canned		100	
Oysters	33	490	8 7
Peaches, canned:			
Clingstone		35	
Freestone		45	
Pears, canned		19	
Peas, fresh	79-190	380 1040	3 5
Canned		120	
Dried	300	2100	18 0
Peanuts, roasted	300	2500	34 0
Pineapple, canned		85	
Pork muscle		470-1100	2 4 6
Bacon	29-100	280-980	7 5
Ham	19-170	340-660	4 6
Loin	86-270		
Potatoes	220-320	320 650	0 6
Prunes		60	
Italian, canned		38	
Pumpkin, canned		400	
Raisins	94	90	3 1
Rice, polished		400	
Bran		1500 2700 (av. 2200)	
Salmon, canned	450	580 700	15 0
Sardines, canned:			
Atlantic	160	470	4 0
Pacific	280	600	24 0
In tomato sauce	220	450	27 0
Shrimp, dry pack		255	
Wet pack		185	
Soybeans		1800	
Spinach	83	120 180	6 9
Canned		45	
Strawberries	44	260	4 0
Taro root		700	
Tomatoes	60	100	4 0
Canned		200 370 (av. 220)	
Tuna, canned in oil	440	420	3 0
Turnips	110	37	2 1
Veal	56-130	110 260	1 4 2
Walnuts, English		800	
Wheat, whole		510 1100	5 2 7
Bran		2000 3000 (av. 2400)	
Germ	600 1750	700 850	
White flour		300	0 7
Yeast, dried	3600	20,000	
Zucchini		140 350 (av. 300)	

TABLE 56. **Vitamin Content of Strained and Chopped Foods Prepared for Infant Feeding.**

Food items.	*Vitamin A (I.U.)*	*Thiamine (γ)*	*Riboflavin (γ)*	*Niacin (mg.)*	*Ascorbic Acid (mg.)*
	Value per 100 grams or 100 cc.				
Beech-Nut:					
JUNIOR FOODS:					
Beans, green	320	32	81	0.7	7.7
Beets	10	8	28	0.3	3.3
Carrots	5300	20	29	0.5	1.7
Chicken soup	640	35	38	0.5	0.8
Liver soup	1660	26	440	1.5	4.7
Pineapple rice pudding	118	32	57	0.3	1.0
Prunes	410	25	19	1.2	1.6
Raisin rice pudding	114	23	106	0.8	2.0
Spinach	3370	20	157	0.6	12.1
Vegetable and beef	900				
Vegetable and lamb	1750	12	85	0.4	1.4
Vegetable soup	1380	20	20	0.5	0.8
Vegetables with bacon	1033	35	40	0.8	0.8
STRAINED FOODS:					
Apple and apricot	400	19	13	1.1	0.4
Apple sauce	63	17	7	0.5	0.9
Beans, green	290	22	99	0.8	2.5
Beets	4	9	50	0.3	4.9
Carrots	10280	18	16	0.6	2.7
Chicken soup	500	42	50	0.6	0
Custard pudding	198	12	129	0.2	0.5
Liver soup	2240	22	430	1.2	3.5
Peaches	350	15	12	0.6	3.3
Pears	43	11	15	0.3	0.5
Peas	280	73	76	1.1	9.2
Pineapple pudding	88	30	55	0.6	0.3
Prunes	520	19	51	0.4	1.8
Spinach	2860	10	108	0.6	9.9
Squash	2540	18	63	0.2	2.9
Tomatoes with milk	1520	32	200	0.4	2.8
Vegetable and beef	1960	15	30	1.0	0.9
Vegetable and lamb	1340	12	90	1.5	1.4
Vegetable soup	2480	30	21	0.6	0.7
Vegetables with bacon	1220	47	56	0.7	0.4
Campbell:					
STRAINED SOUPS					
Beef	1693	37	72	1.3	3.9
Chicken	1766	18	40	0.8	1.1
Lamb	1130	36	68	1.2	2.7
Liver	7000	80	62	1.5	7.3
Vegetable	2550	69	64	1.0	7.5
Clapp:					
Baby cereal		1000	300		
Baby oatmeal		1000	300		
JUNIOR FOODS					
Apple sauce	116	10	12	Trace	1.1
Apricots with farina	1633	29	20	0.3	1.1
Carrots	7866	27	13	0.4	2.2
Chicken soup	1350	40	28	0.5	1.1
Chocolate pudding	116	9	239	0.2	1.5
Fish chowder		45	54		
Peaches	366	16	14	1.0	1.0
Pears	167	2	32	Trace	1.1
Pineapple pudding	150	24	239	0.2	1.2
Prunes	466	24	25	0.8	4.7
Spinach	4400	41	93	0.2	6.3
Vegetable soup	6200	26	27	0.4	1.3

Food items.	Vitamin A (I.U.)	Thiamine (γ)	Riboflavin (γ)	Niacin (mg.)	Ascorbic Acid (mg.)
	Value per 100 grams or 100 cc.				
Clapp: (cont.)					
JUNIOR FOODS (cont.)					
Vegetables, creamed	2833	26	99	0.4	1.4
Vegetables with bacon	7016	67	10	0.7	1.5
Vegetables with beef	4366	18	48	0.7	1.7
Vegetables with lamb	3416	39	34	0.7	2.0
Vegetables with liver	4233	55	487	1.5	1.4
STRAINED FOODS					
Apple sauce	116	9	10	Trace	1.1
Apricots and apples with farina		6			
Beans, green	533	28	57	0.3	3.6
Carrots	8600	24	12	0.5	2.3
Chicken soup	1433	16	133	0.2	0.5
Custard pudding	333	12	46	0.1	1.1
Liver soup	2833	43	470	1.6	1.7
Peaches	200	51	25	0.3	1.7
Pears	167	1	29	Trace	1.4
Peas	600	89	69	1.1	9.1
Pineapple pudding	133	24	130	0.1	2.1
Prunes	450	163	29	0.7	3.2
Squash	1083	35	75	0.5	5.6
Vegetable soup	1333	25	71	0.4	2.0
Vegetables, creamed	1033	23	128	0.4	1.5
Vegetables, mixed	966	13	26	0.4	1.2
Vegetables with bacon	5600	77	9	0.7	1.8
Vegetables with beef	2000	16	86	0.5	0.3
Vegetables with lamb	2966	30	43	0.6	2.0
Gerber:					
PRECOOKED CEREALS, DRY					
Barley cereal		2000	500	8.4	
Cereal food		1800	300	6.7	
Strained oatmeal		2000	300	4.3	
CHOPPED FOODS					
Apple prune pudding	360	25	77	0.1	1.8
Beans, green	640	42	77		5.6
Carrots	15190	25	32	0.6	2.8
Meats:					
Beef		15	217	7.1	
Liver		74	3440	14.7	
Veal		29	301	8.6	
Peaches	1575	7	25	0.8	2.5
Pineapple rice pudding	35	21	60	0.2	3.2
Spinach	4080	28	98	0.2	7.0
Vegetable and beef	3000	32	46	0.5	1.4
Vegetable and lamb	3510	35	46	0.4	2.5
Vegetable and liver	2140	39	280	1.1	3.2
STRAINED FOODS					
Apple sauce	93	14	35	0.1	1
Apricots with farina	4070	21	25	0.3	2.5
Beans, green	605	32	74	0.5	5.6
Beets	18	14	35	0.1	7.5
Carrots	11620	25	42	0.6	3.5
Chocolate custard	74	32	154	0.2	1
Custard pudding	64	35	158	0.2	1
Liver soup	2680	60	469	2.0	5.2
Meats:					
Beef		12	193	3.4	
Liver		65	2270	8.3	
Veal		38	311	6.1	
Mixed vegetables	5290	224	84	0.5	1.8
Peaches	950	18	39	0.5	2.5

Food items.	Vitamin A (I.U.)	Thiamine (γ)	Riboflavin (γ)	Niacin (mg.)	Ascorbic Acid (mg.)
	Value per 100 grams or 100 cc.				
Gerber:					
STRAINED FOODS (cont.)					
Pears	64	14	32	0.3	1
Pear pineapple	64	25	21		0.7
Peas	565	98	66	0.9	6.6
Prunes	815	28	60	0.5	4.2
Spinach	3045	28	112	0.3	9.1
Squash	1720	25	66	2.5	6.0
Vegetable and lamb	2465	32	42	0.7	2.5
Vegetable soup	2805	49	96	0.3	1
Heinz:					
PRECOOKED CEREALS, DRY					
Cereal food		1200	880	22.8	
Oatmeal		1230	880	22.8	
JUNIOR FOODS					
Apple, fig and date dessert	22	18	43		2.5
Chicken farina vegetable porridge	370	110	110	1.2	1.7
Chopped carrots	4000	36	58	Trace	3.1
Chopped green beans	650	38	81		8.0
Chopped mixed vegetables	2000	27	55		1.8
Chopped spinach	4500	33	200		7.8
Creamed diced vegetables	2500	21	140	1.3	3.1
Creamed tomato and rice	1500	60	98		10.0
Pineapple rice pudding	38	27	70		0.8
Prune pudding	300	30	180		3.2
Vegetables with lamb and liver	2600	27	180	1.5	3.2
STRAINED FOODS					
Apple prune pudding	130	19	71		1.4
Apple sauce	32	Trace	14		2.5
Apricots and apple sauce	4100	21	45		2.0
Apricots with oatmeal	3100	39	17		3.5
Beans, green	1200	33	78	Trace	8.0
Beef and liver soup	5700	39	220	1.8	8.0
Beef broth with beef and barley	74	28	32	1.5	1.7
Beets	14	45	28	Trace	10.0
Carrots	6800	24	53		2.6
Custard pudding	55	16	100		2.0
Orange pudding	55	25	71		3.9
Peaches	740	12	Trace		2.7
Pears and pineapple	48	36	43		1.5
Pears with farina		16	13		0.7
Peas	1100	120	120	1.7	14.0
Prunes	800	42	140		9.0
Spinach	5400	27	170	Trace	8.8
Tomato juice	630	40	20	0.9	20.0
Tomato soup	2300	78	130	1.1	22.0
Vegetable and lamb	2700	17	30		0.7
Vegetable soup	1300	218	110		1.4
Libby:					
HOMOGENIZED FOODS					
Apples and apricots	1470	11	13	0.2	4.7
Apples and prunes	250	Trace	100	0.1	3.9
Apple sauce	62	10	13	0.1	4.6
Apricot-farina	2534	13	22	0.3	2.1
Beans, green	413	28	40	0.2	7.2
Beets	9	16	22	0.1	Nil
Carrots	7490	22	23	0.4	8.2
Custard pudding	135	Trace	144	<0.1	Nil
Fruits, mixed (apricots, peaches, pears)	[illegible]	11	11	0.5	2.6
Liver soup	6480	41	128	2.0	2.4

Food items.	*Vitamin A (I.U.)*	*Thiamine (γ)*	*Riboflavin (γ)*	*Niacin (mg.)*	*Ascorbic Acid (mg.)*
	Value per 100 grams or 100 cc.				
Libby:					
HOMOGENIZED FOODS (cont.)					
Peaches	668	10	18	0.9	3 6
Pears and pineapple	5	31	17	0.2	1.4
Peas	417	73	43	0.9	3 6
Prunes with pineapple and lemon juices	775	19	103	0 6	8.9
Spinach	3570	11	65	0.2	17.0
Squash	1562	13	42	0.4	4.9
Vegetable soup	2670	72	43	0 8	2.6
Vegetables, garden (carrots, peas, spinach)	5340	46	32	0.5	1.8
Vegetables, mixed (green beans, pumpkin, tomato)	1200	20	26	0.2	5.1
Vegetables with bacon	4301	38	22	0 6	2.4
Vegetables with beef	4400	77	43	1.3	2.4
Vegetables with lamb	1085	26	82	0.6	1.1
Swift:					
DICED MEATS					
Beef		17	326	4.7	
Heart		156	1067	4.4	
Lamb		42	287	5 3	
Liver		30	2200	7.1	
Pork		452	238	3 7	
Veal		52	350	6 3	
STRAINED MEATS					
Beef		10	242	3 2	
Heart		64	181	4 5	
Lamb		26	264	4 0	
Liver		14	2000	4 4	
Pork		346	278	4.7	
Veal		24	288	4 9	

SUGGESTIONS FOR SAVING VITAMINS.

Esther P. Daniel in "Vitamin Content of Foods" in the Yearbook Separate No. 1681 of the U. S. Dept. of Agriculture, issued in 1940, recommends the following practical suggestions for the preservation of vitamin values in cooking and serving foods:

"Don't stir air into foods while cooking.
Don't put them through a sieve while still hot.
Don't use soda in cooking green vegetables.
In boiling foods, raise the temperature to the boiling point as rapidly as possible.
Use as little water as possible.
Don't use long cooking processes such as stewing when shorter methods are feasible.
Don't throw away the water in which vegetables have been cooked. Use it in making gravies, sauces, and soups.
Don't fry foods valuable for their content of vitamins A, B_1, or C.
Prepare chopped fruit and vegetable salads just before serving.
Start cooking frozen foods while they are still frozen.
Serve raw frozen foods immediately after thawing."

Additional suggestions are given by Munsell (1940):

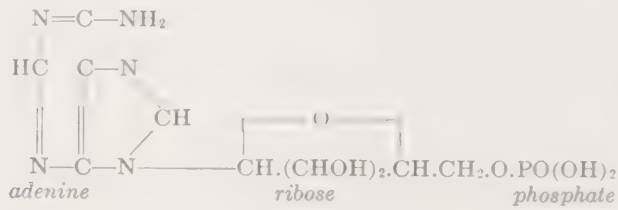
"Do not peel vegetables or fruits and cut them up and then let them stand before cooking. Cook them whole and with the outer covering on helps preserve vitamin content.
Serve foods as soon as possible after they are cooked.
Frying and roasting are very destructive of vitamins.
Store foods at low temperatures and in closed containers."

GLOSSARY OF VITAMIN TERMS.

Achromotrichia. Depigmentation of fur in rats, apparently due to lack of some member of the B-complex.

Adaptometer. An instrument for detecting early evidence of night-blindness.

Adenylic Acid. Adenine ribose phosphate, $C_{10}H_{13}N_5O_4.HPO_3$, enters into composition of co-dehydrogenase I and II. Also called adenosine monophosphate.



Adermin. Early name for vitamin B_6; unsuitable since dermatologic lesions are still seen in the presence of this vitamin; György suggests (1940) that B_6 be called *pyridoxine*.

Almquist-Stokstad Unit. One of many units for vitamin K, approximately equal to one-half an Ansbacher unit.

Alpha. Terms with this prefix will be found under the name of the substance, as alpha-tocopherol under Tocopherol.

A. D. M. A. units. See following items.

American Drug Manufacturers' Association unit for vitamin A. Equivalent to Sherman-Munsell unit.

American Drug Manufacturers' Association unit for vitamin D. Equivalent to about one-third of the I.U. or U.S.P. unit.

Aneurin. European term for vitamin B_1; thiamine.

"Animal Protein Factor". Substance produced by bacterial fermentation in henhouse litter which, when consumed by hens on vegetarian fare, aids in hatching eggs.

Ansbacher Unit. One of the many units employed for vitamin K and roughly equal to 20 Dam units.

Antagonist. A substance chemically related to a vitamin which is capable of counteracting the biological activity of the vitamin in question.

Anti-acrodynia factor. Vitamin B_6, essential for growth and prevention of rat pellagra and dermatitis (György).

Anti-beri-beri vitamin. Vitamin B_1; thiamine.

Anti-hemorrhagic factor. Vitamin K.

Anti-hemorrhagic flavone glucosides. "Vitamin P".

Anti-infective Principle. Used without justification for vitamin A.

Anti-keratinizing vitamin. Vitamin A.

Anti-metabolite. A substance chemically related to naturally-occurring agents within the body and capable of interfering with their normal action.

Anti-neuritic vitamin. Vitamin B_1; thiamine.

Anti-oxidant. A substance capable of retarding chemical deterioration, as rancidity in fats. Examples include (1) a lecithin-tocopherol combination which protects vitamin A from oxidation in air (Kern, 1948), and (2) vitamin C when used to prevent darkening of commercial packs of frozen peaches and apricots.

"Anti-pernicious anemia principle". See LLD factor (Shorb, 1948).

Anti-rachitic factor. Vitamin D.

Anti-scorbutic factor. Vitamin C.

Anti-sterility vitamin. Vitamin E, although reproductive potency is only a part of E function.

Anti-stiffness Factor. Agent first found in fresh kale and fresh raw cream which prevents muscle and wrist changes in guinea pigs, not the grass juice factor nor vitamin E. The stiffness syndrome probably not the primary effect of deficiency of this factor so much as a result of the accompanying deranged phosphorus metabolism. Search is being made for corrective factors among sterol derivatives (Oleson, 1947). A crystalline factor has been isolated from cane sugar juice (van Wagtendonk, 1947). Highly controversial.

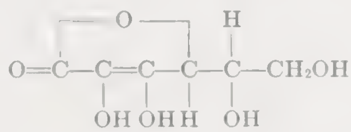
Anti-xerophthalmic vitamin. Vitamin A.

Araboflavin. Antagonist to riboflavin (Euler and Karrer, 1946).

Arachidonic Acid. One of the three recognized essential fatty acids: $C_{19}H_{31}COOH$ possessing 4 unsaturated bonds which on full hydrogenation yield arachidic acid, $C_{19}H_{39}COOH$.

$CH_3(CH_2)_4CH=CHCH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_3COOH$

Ascorbic Acid. White crystalline substance soluble in water and alcohol, $C_6H_8O_6$, of the seven structural variants of this acid already synthesized, *l*-ascorbic acid is the most potent and is the compound indicated when vitamin C or simply ascorbic acid is mentioned:



l-ascorbyl palmitate. Agent used as lard preservative; possesses antiscorbutic activity (equivalent on molar basis).

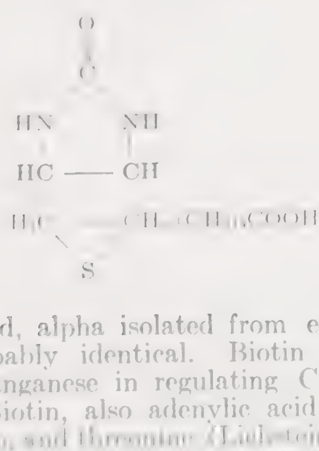
A. T. 10. Trade name for dihydrotachysterol emphasizing its anti-tetany effect.

Avidin. Also known as avidalbumin, the agent in raw egg-white which combines with biotin and renders it useless to the body.

Beta. Terms with this prefix will be found under the name of the substance, as beta-carotene under Carotene.

Biophotometer. An American instrument (Frober-Faybor Company, Cleveland, Ohio, 1937) which is more sensitive than the Birch-Hirschfeld photometer in detecting border-line cases of vitamin A deficiency.

Biotin. Previously known as Vitamin H and Coenzyme R. Crystalline biotin obtained in 1941 by DuVigneaud, $C_{10}H_{16}O_3N_2S$. Commercially available as the crystalline monomethyl ester. Biotin is hexahydro-2-oxo-1-thieno-(3,4) imidazole-4-valeric acid:



Two forms postulated, alpha isolated from egg-yolk and beta from liver and milk; probably identical. Biotin functions as a catalyst which joins with manganese in regulating CO_2 utilization in plant and animal cells. Biotin, also adenylic acid, activates deamination of aspartic acid, serine, and threonine (Lichstein and Christman, 1948).

Birch-Hirschfeld photometer. An instrument devised in 1916 for the measurement of dark adaptation; manufactured by Carl Zeiss, Inc.

Bisulfite binding substances (B.B.S.). Chiefly pyruvic acid in biologic fluids; increased in thiamine deficiency.

Blue units. Means of measuring the blue color obtained with $SbCl_3$ and vitamin A or carotene.

Butter Growth Factor. Appetite-stimulating factor in butter as contrasted with vegetable fats in the diet of rats when lactose is the sole carbohydrate; advantage disappears when other carbohydrates are introduced.

Calciferol. Crystalline vitamin D_2, pure activated ergosterol.

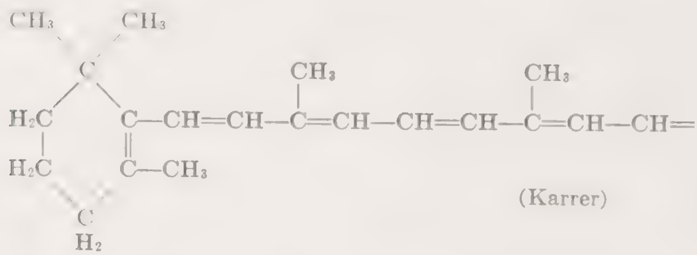
Calcifying vitamin. Vitamin D.

Capillary resistance. Resistance of capillary wall to rupture under pressure.

Carboxylase. An enzyme which converts the carboxyl group ($-COOH$) into CO_2.

Carotenase. An enzyme occurring in the liver which transforms carotene into active vitamin A.

Carotene. An intensely yellow hydrocarbon pigment, $C_{40}H_{56}$, three forms exist: alpha, beta, and gamma, beta being the most active precursor of vitamin A; its half-formula is:



(Karrer)

Crystalline carotene is available in separate alpha and beta forms or as a mixture consisting of 90% of the latter and 10% alpha.

Carotin. Identical with carotene.

Carotinoid pigments. A group of lipochromes which may be hydrocarbons (as carotene), alcohols (as kryptoxanthin), ketones or acids; characterized by many double bonds.

Cereal germ. Embryo of wheat removed in milling of flour; highly concentrated source of vitamin B_1 and E; also contains large amount of B_2 and an appreciable amount of A; it is a good source of nicotinic acid and pyridoxine.

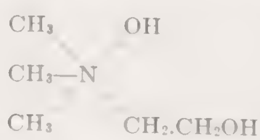
Cevitamic acid. The term for vitamin C favored by the Council of Pharmacy of the American Medical Association, whereas chemical opinion inclines toward ascorbic acid, which see.

Chick antidermatitis factor. Pantothenic acid.

Cholane nucleus. See under ergosterol.

Cholesterilene sulfonic acid. One of the vitamin D group (Yoder, 1936–37).

Choline. Hydroxyethyl trimethyl ammonium hydroxide:



Member of the vitamin B complex, particularly concerned with metabolism of fats and the sulfur-containing amino acids. Commercially available as choline chloride.

Citrin. Original term used by investigators for vitamin P isolated from lemons. It is a mixture of eriodictin, eriodictyol glucoside, hesperidin and quercitrin-like flavone pigments. Related agents are hesperidin, chalcone and rutin. These manifest anti-oxidant activity toward epinephrine, also toward milk fat and lard.

Coacetylase. Possibly pantothenic acid functions in a coenzyme for acetylation processes, such as occur naturally as with choline or when drugs, like sulfonamides, are employed. Lipmann's enzyme (1947).

Cocarboxylase. Thiamine pyrophosphate, diphosphothiamine or phosphorylated vitamin B_1; functions as a catalyst for the oxidation and decarboxylation of pyruvic acid which is an intermediary product in carbohydrate metabolism.

Codecarboxylase. Pyridoxal phosphate.

Co-dehydrogenase I. Cozymase; consists of nicotinamide, adenylic acid, ribose and phosphoric acid.

Coenzyme A. Coacetylase (Kaplan and Lipmann, 1947).

Coenzyme I. Cozymase; diphosphopyridine-nucleotide; functions as a hydrogen transporter in biologic oxidations; in red blood cells rapidly inactivated by hemolysis; 20–35γ per gram of whole human blood (Axelrod and Elvehjem, 1939).

Coenzyme II. Triphosphopyridinenucleotide; Warburg's coenzyme.

Coenzyme R. A growth and respiratory factor for many strains of the legume nodule organism Rhizobium; Biotin.

Coferment. Warburg's term for the cozymase of von Euler.

Covitamins. Substances present in foods which stabilize the vitamins against inactivation.

Cozymase. Co-dehydrogenase, diphosphopyridine nucleotide (nicotinamide, adenylic acid, ribose and phosphoric acid).

Cryptoxanthin. A yellow pigment capable of conversion into active vitamin A.

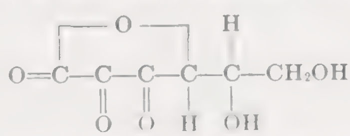
Dam unit. This unit for vitamin K is based on a specially prepared dry spinach arbitrarily assigned 500 units per gram. 1 gram pure Vitamin K_1 = 12,000,000 Dam units.

Dann Unit. One of several employed for vitamin K and very roughly equivalent to 25 Dam units.

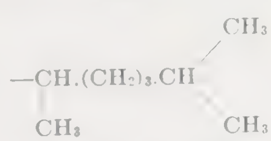
Dark adaptation. The increasing sensitivity of the eye to light in a "totally" darkened room.

Dark adaptation test. A light sensitivity test for determining vitamin A deficiency.

Dehydro-ascorbic acid. A reversibly oxidized form of ascorbic acid.



7-dehydrocholesterol. When activated becomes vitamin D_3. The formula is similar to that shown for ergosterol except that the side chain is:

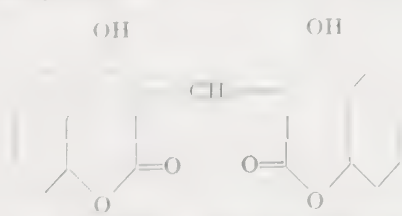


Dehydrogenase. An enzyme which catalyzes a reaction resulting in oxidation of metabolites by removal of hydrogen (Best and Taylor, 1937).

7-Dehydrositosterol. One of the provitamin D group (Wunderlich, 1936).

Desoxypyridine. Antagonist to pyridoxine (Ott, 1946).

Dicoumarol. 3,3′-methylene-bis-(4-hydroxycoumarin):

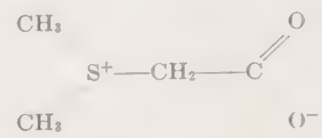


synthesized by Link et al (1941); prolongs prothrombin and coagulation times; action inhibited by large doses of vitamin K; sometimes classed with the vitamins.

22-Dihydroergosterol. When activated becomes 22-dihydrocalciferol or vitamin D_4.

Dihydrotachysterol. An irradiation product of ergosterol without antirachitic effect; it combats tetany by raising the serum calcium content.

Dimethylthetin. Also called sulfobetaine, a biological source of labile methyl groups (duVigneaud, 1948):



Diopterin. Trade name for modified form of folic acid: alpha form of pteroyldiglutamic acid.

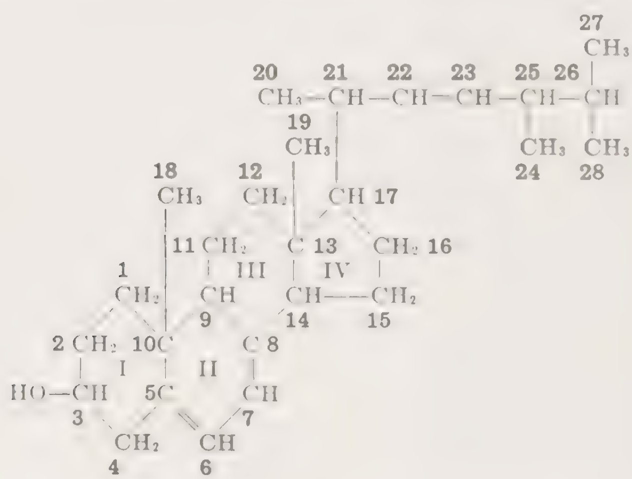
Diphosphopyridine nucleotide. Coenzyme I, consists of one nicotinamide group, one adenine, two pentose, and two phosphoric acid groups.

Durohydroquinone. A substance chemically related to vitamin E.

Dysaptation. Pathologic dark adaptation in which the time required for reaching the light threshold is prolonged beyond the normal period (Feldman).

Egg-white injury. Toxic effect of avidin in raw egg-white.

Ergosterol. Provitamin D_2; structural formula demonstrates numbering of positions in cholane nucleus and side chain:



Activation is thought to result in opening ring II between ninth and tenth carbon atoms, with the result that the eighteenth carbon atom drops a hydrogen and receives a double bond.

Eriodictin. See citrin.

Evans unit. This unit for vitamin E is based on the minimum requirement whereby normal rat litters are obtained under fixed conditions.

Factor I. Antidermatitis factor of Lepkovsky, Jukes, and Krause (1936); vitamin B_6.

Factor S. Essential for chicks, apparently correlated with or identical to strepogenin (Scott, 1947).

Factor U. A water-soluble growth factor required by chicks in addition to polished rice, washed fish meal, riboflavin and vitamin B_1 (Stokstad *et al.*, 1940).

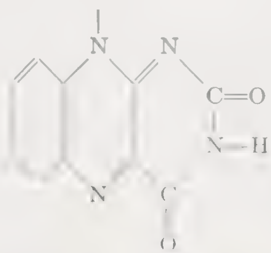
Factor W. Frost and Elvehjem's (1937) rat growth factor apparently required if riboflavin is to be fully effective; is multiple in nature, containing in concentrates appreciable amounts of pantothenic acid.

Factor Y. Antidermatitis factor of Chick and Copping (1930), possibly vitamin B_6.

Fatty acids, essential. The three acids in this classification can replace each other dietetically. For structure, refer to linoleic, linolenic and arachidonic acids. While these acids are needed in the diet, other agents must be made available to the body for controlling peroxide formation at the double bonds, else toxic effects (as anemia) or destructive action results. The latter is known to affect carotene, vitamins A and E, and certain members of the B complex with the consequence that deficiency symptoms may arise.

Filtrate Factor. Lepkovsky and Jukes' (1936) water-soluble, chick antidermatitis factor obtained from liver extract; identified as pantothenic acid but undoubtedly multiple in nature; also used for rat growth factor.

Flavins. Water-soluble, yellow-green fluorescent pigments which occur in food-stuffs, either free or bound to protein, chemically they are characterized by the iso-alloxazin nucleus:

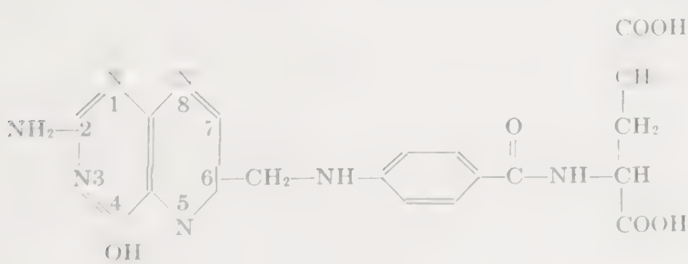


Although often designated as to source as hepatoflavin, ovoflavin, lactoflavin, etc., the common name for all is riboflavin because of the presence of the sugar ribose as a side chain on the tricyclic chromophore nucleus. Addition of this sugar to the chloroform-soluble nucleus renders the compound water-soluble. The only side chains compatible with vitamin potency are d-ribose and l-arabinose (Booher, 1938).

Flavones. A group of pigments including vitamin P.

Flavoprotein. Protein combination with riboflavin (vitamin B_2) which functions as an oxidation catalyst; the yellow enzyme.

Folic Acid. This term has been used to cover a group of related substances found in green leaves. The synthetic product obtained in 1946 is known as pteroylglutamic acid. Other active agents include pteroic acid, pteroyl triglutamic and heptaglutamic derivatives. The suggested chemical structure involves a pyrimido-(4,5)-pyrazine (or pterin) nucleus linked to para-aminobenzoic acid and this in turn to glutamic acid:



Names describing folic acid activity: Vitamin B_c, L. casei factor, vitamin M, PGA, pteroylglutamic acid (synthetic).

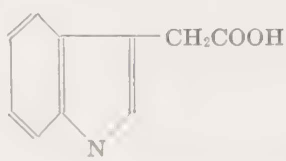
Folic acid conjugate. Pteroyl-hexa-glutamyl-glutamic acid.

Funk's vitamine. Vitamin B_1; thiamin.

Gamma. Terms with this prefix will be found under the name of the substance, as gamma-carotene under Carotene.

Gamma. 0.001 mg. = 1 γ, used for convenience in designating concentrations of very low value; same as microgram, μg.

Glare blindness. An abnormal sensitiveness to brilliant illumination which may be due to vitamin A deficiency; the term, nyctalopia, is sometimes applied to this condition.
Goldberger's vitamin. Vitamin G, vitamin P-P, pellagra-preventive vitamin.
Grass Juice Factor. A growth-promoting, water-soluble factor found in summer milk, green grass and some vegetables apparently needed by guinea pigs, rabbits and rats.
György. This Hungarian name is borne by two noted investigators in the realm of water-soluble vitamins and respiratory enzymes: Albert Szent-Györgyi and Paul György.
Hemeralopia. Literally, day sight, but by convention used for night blindness.
Hepatoflavin. Flavin isolated from liver; riboflavin, vitamin B_2.
Hesperidin. A flavanone glucoside found in lemons and oranges which when acted upon by a mild alkali gives the acid-unstable hesperidin chalcone.
Hexachlorocyclohexane. An insectide analogue of inositol inhibiting its action in yeast.
Hexahydroxycyclohexane. Inositol.
Hexuronic acid. Early and erroneous chemical name for vitamin C.
7-Hydroxycholesterol. One of the provitamin D group (Bills, 1938).
Indole acetic acid. Agent found in corn which has a pellagragenic effect:



Inhibitors. Substances chemical related to vitamins which are capable of antagonizing biological activity of their analogues.
Inositol. Inosite. Cyclic hexahydric alcohol, $C_6H_6(OH)_6$; member of vitamin B complex; mouse alopecia factor (Wooley, 1940); growth factor for rats and curative of spectacled eye (Pavcek and Baum, 1941). May be essential part of enzyme α-amylase (R. J. Williams, 1948).
International Unit of Vitamin A. 0.0006 mg. beta-carotene.
International Unit of Vitamin B₁. 0.003 mg. thiamine hydrochloride (adopted by international committee on vitamin standardization, 1938; accepted by Council on Foods, A. M. A., 1939).
International Unit of Vitamin C. 0.05 mg. ascorbic acid.
International Unit of Vitamin D. 0.025γ calciferol.
Keratitis. A sometimes blinding eye disease caused by riboflavin deficiency.
Keratomalacia. Softening of the cornea; last stage of eye manifestations of vitamn A deficiency.
Kitol. Substance found in whale liver oil which decomposes on heating to vitamin A; occurs in other fish liver oils also, except in some fresh water species; is chemically but not biologically provitamin A.
"Koagulations-vitamin." Vitamin K.
Kryptoxanthin. A yellow pigment, $C_{40}H_{55}OH$, capable of conversion into active vitamin A; found in egg-yolk and yellow corn.
Lactoflavin. Flavin isolated from milk; riboflavin, vitamin B_2.
L. C. F. L. casei factor; folic acid.
Light threshold. Smallest amount of light visible to the dark-adapted eye.
Linoleic acid. One of the three recognized essential fatty acids $C_{17}H_{31}COOH$, possessing two unsaturated bonds. On complete hydrogenation stearic acid, $C_{17}H_{35}COOH$, is formed.

$$CH_3(CH_2)_4CH=CHCH_2CH=CH(CH_2)_7COOH$$

Linolenic acid. Another of the essential fatty acids, $C_{17}H_{29}COOH$, possessing three unsaturated bonds:

$$CH_3CH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_7COOH$$

Lipmann's Coacetylase. An enzyme containing pantothenic acid involved in acetylation of aromatic amines and in choline metabolism.

Lipocaic. Name applied to fraction from pancreas which prevents or relieves fatty livers in depancreatized dogs.

LLD factor. Lactobacillus lactis Dorner requires two agents which have been detected and named LLD and TJ factors. LLD factor apparently is related to activity of commercial liver preparations used in treating pernicious anemia, and has been labelled vitamin B_{12} (Rickes, 1948).

Lovibond blue units. Means of measuring the blue color obtained with $SbCl_3$ and vitamin A or carotene in which the Lovibond glasses serve as standards.

Lumisterol. Isomer of ergosterol obtained during activation, non-antirachitic.

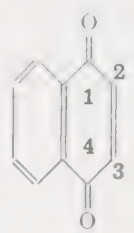
Lycopene. A red carotenoid pigment found in tomato and watermelon.

Menadione. Trade name for synthetic vitamin K, 2-methyl-1:4-naphthoquinone.

Menaphthone. British trade name comparable to the American menadione.

MPF. Multi-Purpose Food, an all-vegetable, low-cost protein food currently sent from the U. S. A. to famine areas; a source of protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin and vitamin D.

1,4-Naphthoquinones. The nucleus in vitamin K:

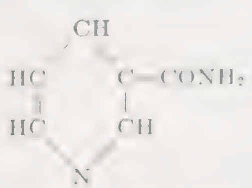


Neovitamin A. Geometrical isomer of vitamin A isolated from fish-liver oils (Robeson and Baxter, 1947). Present in synthetic vitamin A.

"Nerve" vitamin. Vitamin B_1; thiamine.

Niacin. Term recommended for nicotinic acid when addressed to the general public to avoid the connotation of poisoning popularly associated with nicotine. Scientific literature should continue to use the term nicotinic acid.

Nicotinamide and nicotinic acid. The pellagra-preventive vitamin; Goldberger's vitamin; pyridine-β-carboxylic acid, $C_5H_4N.COOH$, or the amide:



Night-blindness. Subnormal acuity of vision in dim light or slowness of recovery of vision after exposure to a dazzling light.

Nyctalopia. Used by some to designate night-blindness or glare blindness.

Nyctanopia. Literally, night sight, used by some for night-blindness.

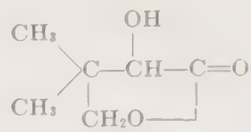
Oslo unit. 1 I.U. or U.S.P. unit of vitamin D = 1.6 Oslo units.

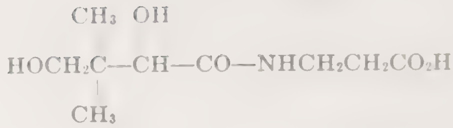
Ovoflavin. Flavin isolated from eggs, riboflavin, vitamin B_2.

PABA. Para-aminobenzoic acid.

Pantothenate Inhibitor. Several are known, such as phenylpanthenone, a bacteriostatic agent counteracted by glutamic acid, proline or histidine.

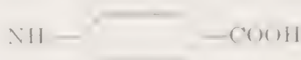
Pantothenic acid. The 8th vitamin to be synthesized (Williams, Major, Stiller, Keresztesy and Finkelstein, 1940); the physiologically active pantothenic acid (II) is α-hydroxy-β,β-dimethyl-γ-butyrolactone (I) condensed with β-alanine:

(I) 

(II) 

Pantothenic acid functions as a coenzyme regulating acetylation reactions.

Para-aminobenzoic Acid. A member of the Vitamin B Complex,



It antagonizes the action of the sulfonamide drugs (Woods, 1940).

Pellagra-preventive vitamin. Nicotinic acid or its amide.

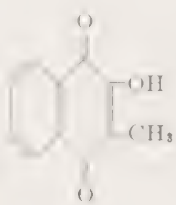
Permeability vitamin. Vitamin P, the existence of which is disputed.

Petechiæ. Small, subcutaneous clots caused by rupture of the capillary walls.

PGA. Pteroylglutamic acid, synthetic folic acid.

Phosphatase. An enzyme which releases inorganic P from organic combination.

Phthiacol. A yellow pigment isolated from human tubercular bacilli known to possess vitamin K activity; somewhat toxic; vitamin K can be converted into phthiacol (Fieser, 1940).



Porphyrins. Certain pigments which result from abnormal degradation of hemoglobin or from precursors of hemoglobin; associated with nicotinic acid deficiency.

Poulsson unit. Same as Oslo unit of vitamin D.

P-P body. Term used by Goldberger for factor preventive of human pellagra; formerly believed identical with vitamin B_2 or G, now thought to be nicotinic acid or its amide.

Protective factor X. Vitamin-like substance which protects against egg-white injury (Boas, 1927).

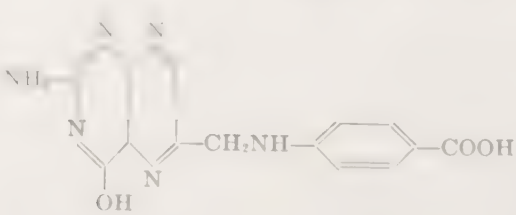
Prothrombin factor. Vitamin K.

Provitamin A. Carotene.

Provitamin D. Ergosterol and related sterols.

Pterins. See Pteroic acid.

Pteroic acid. Precursor of folic acid. Its formula shows the pterin nucleus combined with para-aminobenzoic acid.



Pyridoxal phosphate. A coenzyme unit in transaminase systems involving glutamic and aspartic acids. Also, a coenzyme in decarboxylation of arginine, glutamic acid and tyrosine. Also, may aid in converting pyruvate, ammonia and indole into tryptophane.

Pyridoxamine. Irradiated pyridoxamine is under investigation as a killing agent for gram-negative micro-organisms not affected by penicillin, as in typhoid and dysentery (Shwartzman, 1948). See also Vitamin B_6.

Pyridoxine. See vitamin B_6.

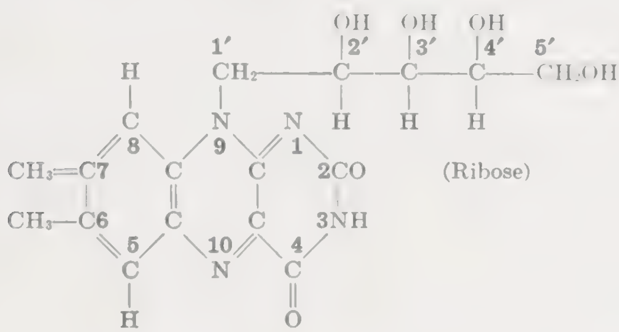
Pyruvic acid. $CH_3.CO.COOH$,

Retinene. Visual yellow, the pigment which results when rhodopsin is bleached by light.

Rhizopterin. On hydrolysis yields formic acid and pteroic acid, a precursor of folic acid.

Rhodopsin. Visual purple, the photosensitive pigment of the rods of the retina.

Riboflavin. Lacto-, ovo-, or hepatoflavin, vitamin B_2 or G, an orange-yellow crystalline pigment (12 mg. dissolves in 100 cc. of water at 27.5° C. to make a yellow-green fluorescent solution); 6,7-dimethyl-9-(1′-*d*-ribityl)-isoalloxazin, $C_{17}H_{20}N_4O_6$.



Rutin. A glucoside of quercitrin obtained from many sources but commonly associated with buckwheat. It decreases capillary fragility in man under conditions where the fragility has first been increased (Griffith, 1944).

Sherman-Bourquin (1931) Unit of Vitamin B_2. Earlier taken as 0.0025 mg. riboflavin; accepted by Council on Foods, A. M. A., 1939, as about 0.003 mg. riboflavin; stated by Munsell (1940) to be equivalent to 3.0–3.5 micrograms.

Sherman-Chase unit. A unit for vitamin B_1 variously regarded as equivalent to one-half or one-fourth of the International Unit; although varying from 0.7 to 4 or 6 Sherman units, Munsell (1940) suggests that 1 International Unit generally is equivalent to 1 Sherman unit.

Sherman unit for vitamin C. Equivalent to 10–15 I.U., lower value accepted by Munsell (1940).

Sherman-Munsell unit. Equivalent to about 1.4 I.U. of vitamin A (1933); Council on Foods of A. M. A. (1939) insists upon use of factor 0.75 for conversion of Sherman units into International Units; Munsell (1940) suggests that 1 Sherman unit be taken as 0.7 I.U.

SLR Factor. Streptococcus lactis R factor, possibly pteroic acid. See folic acid.

Steenbock unit. Equivalent to 3.3 I.U. of vitamin D.

Strepogenin. Growth factor and nutritive essential for certain hemolytic streptococci (Woolley, 1941); probably a peptide.

Sulfobetaine. See dimethylthetin.

Suprasterol. Isomer of ergosterol obtained during activation, slightly toxic.

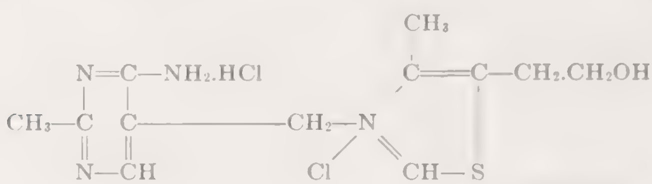
Tachysterol. Isomer of ergosterol obtained during activation, not antirachitic.

Teropterin. Trade name for pteroyltriglutamic acid (the γ—γ form; 5 isomers are recognized by suitable linkages of alpha and gamma forms.

Thayer-Doisy Unit. One of the many units employed for vitamin K, roughly equivalent to 30 Dam units.

Thiamine. Vitamin B_1, aneurin, torulin.

Thiamine hydrochloride. U.S.P. term for thiamine chloride, the hydrochloride of vitamin B_1, $C_{12}H_{17}N_4SO.Cl.HCl$:



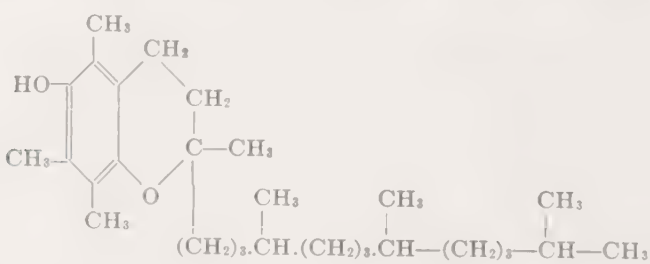
(Williams)

Thiochrome. A blue fluorescent compound derived from thiamine by oxidation, possessing no vitamin activity.

Tillmans' indicator. 2,6-dichlor-phenol-indophenol, used for determining ascorbic acid.

TJ factor. See LLD factor.

α-Tocopherol. One of the forms of vitamin E, deriving its name from the Greek, to bear child; reddish-yellow, highly viscous oil soluble in most fat solvents and the majority of vegetable oils; 2-methyl-2-hexadecyl-6-hydroxy-5,7,8-trimethylchromane, $C_{29}H_{50}O_2$:



β-Tocopherol. Xylotocopherol, $C_{28}H_{48}O_2$, one of the E group; ortho, meta, and para forms are all active; the para position of hydroxyl group and oxygen bridge is vital to E activity.

γ-Tocopherol. An isomer of β-tocopherol, found particularly in cottonseed and corn embryo oils.

α-Tocoquinone. Oxidation product of α-tocopherol, first thought to have E activity.

Torulin. Vitamin B_1; thiamine.

Toxisterol. Isomer of ergosterol obtained during activation, not antirachitic, toxic.

Transaminase. Also called co-aminopherase. This enzyme reaction involves mutual exchange of amino and keto groups, possibly acting through pyridoxal⇄pyridoxamine.

Tri-ethylcholine. Antagonist of choline by competing with it.

Triphosphopyridine nucleotide. Coenzyme II, contains one nicotinamide group, one adenine, two pentose, and three phosphoric acid groups.

United States Pharmacopeia units for vitamins A and D. U.S.P. XIII (1947) unit is the same as International Unit.

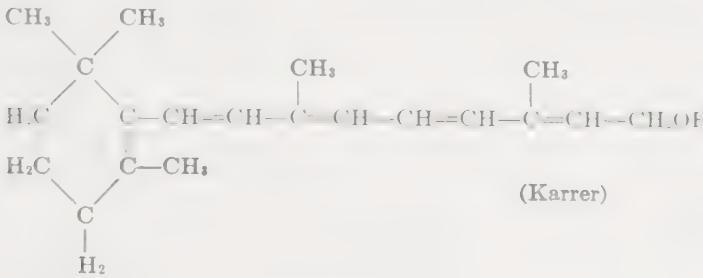
"Universal" vitamin. Pantothenic acid.

Vaccenic Acid. Isomer of oleic acid, $C_{17}H_{33}COOH$, with double bond between C_{11} and C_{12} carbons; good growth factor for rats found in summer butter.

Visual purple. Rhodopsin, the pigment found in the retinal rods which requires vitamin A for its production.

Visual yellow. Retinene, the pigment which results when rhodopsin is bleached by light.

Vitamin A. Fat-soluble, anti-xerophthalmic vitamin, $C_{20}H_{29}OH$:



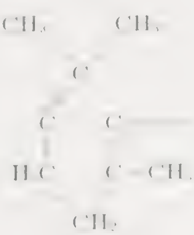
(Karrer)

Vitamin A Standard. Vitamin A acetate in corn oil (new as of July 1947).

Vitamin A synthetic. Synthesized by Arens and van Dorp (1947) and commercial production begun in September 1947. Identical with natural vitamin A of marine origin, a mixture of vitamin A and neovitamin A.

Vitamin A$_2$. Examination of tissues of salt water fish and their liver oils with the fluorescent microscope reveals a brilliant yellow fluorescence which is ascribed to vitamin A. Fresh water fish show a brownish-orange fluorescence The latter has been designated vitamin A_2. Both types are destroyed by the irradiation.

Vitamin A_2 has been obtained in pure form by Shantz (1948). Its formula is unsettled although some believe it is related to vitamin A as lycopene is to beta-carotene. The Karrer formula (1941) suggests the ring as opening thus:



Vitamin B. This term should not be used; for clarity "Vitamin B Complex" is preferred.

Vitamin B$_1$. Thiamine, a pyrimidine-thiazole compound of which the chloride is $C_{12}H_{18}N_4SOCl_2$, anti-neuritic vitamin, antiberi-beri vitamin, aneurin; for chemical formula, see thiamine hydrochloride.

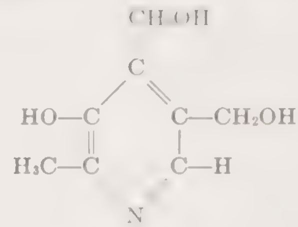
Vitamin B$_2$. Vitamin G, as ordinarily used is a complex consisting of several factors chief of which are riboflavin and nicotinic acid, present tendency (1940) to employ B_2 as designation for riboflavin; sometimes used for that part of the B complex containing riboflavin and B_6; for chemical formula, see Riboflavin.

Vitamin B$_3$. Williams and Waterman's (1927) highly thermolabile factor from yeast, necessary for weight maintenance in birds. Dam and Almquist's gizzard erosion factor may be identical with B_3.

Vitamin B$_4$. Formerly called B_4, Reader's (1929) antiparalysis factor in rats; may involve a condition due to chronic B_1 deficiency; found in yeast.

Vitamin B$_5$. Peters' (1930) thermolabile factor, found in whole wheat and yeast, which maintains pigeon weight on a polished rice diet.

Vitamin B$_6$. György's anti-acrodynia factor; also called vitamin H; also called Factor I; isolated (1938) by Keresztesy and Stevens as the hydrochloride, $C_8H_{12}O_3N.HCl$, synthesized (1939) as 2-methyl-3-hydroxy-4,5-di-(hydroxymethyl)-pyridine:



called *pyridoxine* (György, 1940).

It is thought that this vitamin is as important to protein metabolism as is thiamine to the carbohydrates. Various organisms respond to one or the other forms, but not necessarily to all: pyridoxine, pyridoxal, pyridoxamine, functioning alone or in combination with phosphate.

Vitamin B$_7$. See vitamin I.

Vitamin B$_{12}$. A red crystalline compound obtained from liver and active against pernicious and other anemias; a cobalt complex (Rickes, 1948). Isolated in crystalline form from the mold streptomyces griseus (Merck & Co., 1948).

Vitamin B$_{14}$. Isolated as small brown crystalline balls from human kidney excretions (Norris and Majnarich, 1949); increases production of red blood cells in bone marrow; checks reproduction of cancer cells (rabbit); May be a hormone rather than a vitamin.

Vitamin B$_c$. The Hogan-Parrott factor (1940) which occurs in the B complex, lack of which is responsible for a typical anemia in chicks. Now known to be folic acid.

Vitamin B$_p$. Member of the B complex concerned with the development and shape of bones of chicks (Hogan *et al.*, 1940).

Vitamin B$_t$. Unknown factor required by Tenebrio, the common meal-worm.

Vitamin C. Water-soluble *l*-ascorbic acid, which see.

Vitamin D. A group of activated sterols possessing anti-rachitic potency.

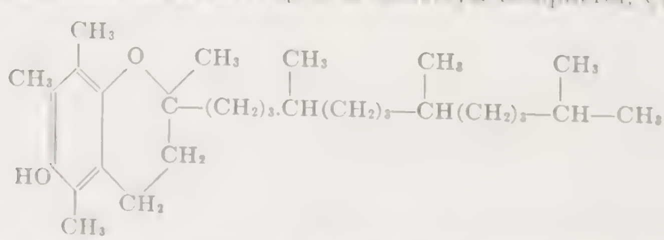
Vitamin D$_1$. Thought to be a pure vitamin but later found to be a mixture of calciferol and lumisterol.

Vitamin D$_2$. Calciferol, the result of irradiating ergosterol which see.

Vitamin D$_3$. The result of irradiating cholesterol or 7-dehydrocholesterol. Crystalline form now available: probably a new standard will be set on this basis.

Vitamin D$_4$. The result of irradiating 22-dihydroergosterol.

Vitamin E. Like vitamin D may contain a number of different forms of a parent substance or several separate factors; α-tocopherol, $C_{29}H_{50}O_2$.



Preferably the term Vitamin E is applied to mixtures of analogues, not to alpha or any of the three other tocopherols known to occur naturally: α, β, γ, δ. The first named is the most potent and is used as the standard of reference. δ-tocopherol is the least active biologically but the best as an antioxidant with decreasing order δ, γ, β, α (Stern, 1947).

Vitamin F. Used by some to designate certain fatty acids, as linoleic essential to nutrition; not endorsed by American Biochemical Association's Nomenclature Committee; no vitamin by this name exists at present (1949)

Vitamin G. Term adopted by the American Society of Biological Chemists in 1929 to describe the antidermatitis or antipellagra component of the vitamin B complex. The corresponding British term is B_2. By 1940 there was a tendency to consider vitamin G a complex with riboflavin known as B_2.

Vitamin H. Water-soluble vitamin which occurs in a complex insoluble both in fat and water; prevents egg-white injury; biotin, coenzyme R and vitamin H are the same.

Vitamin H. This letter assigned by Booher (1937) to a rat growth factor; by McCay, Bing and Dilley (1928) to a factor needed by trout; used by Paul György for a factor found in liver, kidney and yeast whose absence caused a typical dermatitis in rats, now known as B_6, the anti-acrodynia factor; applied by György (1939) to agent which counteracts toxicity of egg-white.

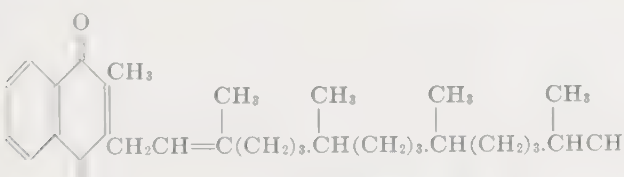
Vitamin H_2. György's factor which offsets egg-white injury.

Vitamin I. Centanni's alcohol extractable factor preventive of digestive disturbances in pigeons; not antineuritic; sometimes called B_7.

Vitamin J. Von Euler and Malmberg's fruit factor said to be corrective of pneumonia in guinea pigs.

Vitamin K. Fat-soluble, antihemorrhagic factor; several derivatives of 1,4-naphthoquinone have been shown to have vitamin potency; the water-soluble 1,4-dihydroxy-2-methylnaphthalene and 4-amino-2-methyl-1-naphthol are also active (Doisy).

Vitamin K_1. The alfalfa principle which is a yellow oil, 2-methyl-3-phytyl-1,4-naphthoquinone,

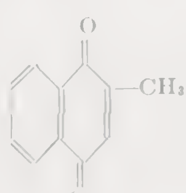


(Doisy, Fieser, 1939–40)

Vitamin K_1. oxide. The introduction of oxygen occurs by opening the double bond in the ring at positions 2 and 3 where the methyl and phytyl side chains occur. This oxide is unlike its parent in that it is not acted upon by light.

Vitamin K_2. A 2,3 substituted 1,4 naphthoquinone; both positions may be occupied by the same unsaturated hydrocarbon chain or there may be a double length chain on 3 and a methyl group on 2. Fieser, Doisy, 1940.

Vitamin K Synthetic. This is more powerful than the natural form. It is 2-methyl-1:4-naphthoquinone. In Vitamin K_1 which is found



in green leaves the side chain is the phytyl radical. In Vitamin K_2, the product obtained with putrefaction processes, the side chain is the difarnesyl radical, notably unsaturated. The potency of 2-methyl-3-difarnesyl-1,4-naphthoquinone is about two-thirds that of Vitamin K_1.

Vitamin K Standard: 1 microgram of 2-methyl-1:4-naphthoquinone = 1 unit.

Vitamin L_1 .Extracted from cow's liver in concentrated form.

Vitamin L_2. Extracted from dried yeast. The L vitamins prevent lactation failure in rats from hypophyseal dysfunction.

Vitamin M. Member of the B complex needed by monkeys for building blood; folic acid subsequently shown to possess vitamin M potency (Day, 1948).

Vitamin P. Rusznyák and Szent-Gyorgyi's flavone compound originally designated as citrin, which see. Several natural compounds are known to supplement the effect of vitamin C in maintaining normal capillary resistance.

Vitamin P-P. Pellagra-preventive, Goldberger's vitamin; nicotinic acid or its amide.

Vitamin U. Unidentified anti-ulcer factor (chicks and guinea pigs); fat-soluble and heat labile; found in alfalfa, kale, fresh milk and greens, raw egg-yolk, wheat bran, liver fat, soybean and olive oils, and gastric mucosa (Chaney, 1948). One liter of fresh cabbage juice per day is associated with speedy healing of ulcers.

Vitamin X. Former designation of vitamin E.

Warburg's coenzyme. Triphosphopyridine nucleotide.

Warburg's enzyme. The yellow respiratory enzyme, a flavo-protein, combined form of vitamin B_2.

Wheat-germ. Embryo of wheat removed in milling of flour; highly concentrated source of vitamin B_1 and E; also contains large amount of G and an appreciable amount of A.

Xanthophyll. Used as synonymous with lutein, $C_{40}H_{56}O_2$, a pigment in green leaves; or as the group name for certain carotenoids of alcohol or ketone structure; not a precursor of vitamin A.

Xanthosis cutis. Pigmentation of the skin attributable to yellow dietary pigments.

Xerophthalmia. A dry and thickened condition of the conjunctiva; occurs in marked vitamin A deficiency.

Xerosis conjunctivæ. Dryness of the conjunctiva, second stage in vitamin A deficiency.

Yellow enzyme. Warburg's enzyme, a flavo-protein which functions as a hydrogen acceptor in biologic oxidations; a combined form of vitamin B_2.

Zeaxanthin. A xanthophyll which is found in yellow corn and egg-yolk.

CHAPTER 12

ALCOHOLIC BEVERAGES.*

Introduction.—Alcoholic beverages of various kinds may become valuable caloric articles of diet and will tend to play an important part in the lives of a great proportion of the population, particularly since the elimination of prohibition in America. For reasons of their fuel value, their appetizing and stomachic reactions, and as thirst quenchers, alcoholic beverages may find permanent places in the lives of many people. A comprehensive list of their composition and fuel values is found elsewhere.

Types of Alcoholic Beverages.

Malt Liquors.—As the name implies, the chief raw material used in the preparation of malt liquors is malt—usually barley malt. The water extraction of the ground malt is boiled with hops, then cooled and, after adding yeast, is fermented; subsequent storage of the fermented fluid for three months or more produces maturity and therewith a characteristic taste and aroma.

The various types of malt liquors, such as **lager beer, ale, porter, stout,** etc., are the result of variations in the process of manufacture, such as the use of different species of yeast, different amounts and kinds of malt and hops. Various methods of processing, such as the selection of specific temperature ranges during the period of mixing (mashing) the ground malt with water or during the main fermentation and storage, again alter the end-product.

Malt liquors have a low alcohol content compared with wines and distilled liquors, but usually have a considerably higher amount of carbohydrate and protein. In countries in which the per capita consumption of beer is high, beer furnishes a considerable part of the entire daily caloric requirement of the average person. Beer, itself, in moderate quantities is not fattening, if not taken with excessive amounts of food. The carbohydrates present in beers are mainly maltose and dextrin, both of which are changed by the human digestive processes into glucose. Most of the malt liquors, like lager beer (the most prevalent malt liquor sold in several countries) and cream ale, contain carbon dioxide gas which is refreshing and thirst quenching. Other malt liquors, like stock ale, etc., are lacking in carbon dioxide and are, in spite of their bitter and malty character, more of a vinous nature. Light beer usually contains somewhat less carbohydrate and somewhat more alcohol than dark beer.

Bottled beer, as sold in the United States, is being subjected in the brewery to a pasteurization process which destroys the last trace of yeast or other microörganisms present. Consequently,

* Data supplied by "Jacob Ruppert," New York.

bottled beer can be kept for weeks at room temperature without turning cloudy or sour.

Keg beer (*i. e.*, draught beer, sold in resturants) is not subjected to any pasteurization, and, therefore, would spoil when exposed for only a very few days to room temperature, due to the rapid development of the small trace of yeast and microorganisms still present. Keg beer, consequently, has to be refrigerated from the time it leaves the brewery until it is consumed. Usually there is no difference in the composition of keg and bottled beer.

Bock beer is the name of a lager beer of dark color. It is usually sold at Easter time and represents a beer made with the use of more malt and hops per barrel, and, therefore, often contains more alcohol and more carbohydrates than regular lager beer.

Ale, porter and **stout** are malt liquors differing from lager beer mainly in the use of another type of yeast, higher fermentation and storage temperatures, thereby producing a particular flavor. Also, the hops are sometimes applied in such a way that a very pronounced hop aroma is produced. Ale, porter and stout are usually only slightly higher in alcohol and carbohydrate content than regular lager beers, but certain brands of stock ale, export stout, etc., exceed in this respect even the strongest luxury lager beers. Malt liquors in general produce a distinctly alkaline ash.

Wines.—Wines are produced in all parts of the world in which grapes grow and where temperate climate prevails. They vary considerably in taste, bouquet, color and composition, depending mainly upon the characteristics of the grape from which the juice is pressed and the exact processing methods connected with the fermentation and aging of the wine. There are many species of grapes: Muscatel, Zinfandel, Concord, Diamond, Delaware, Riesling, etc.; but depending on soil, fertilization, altitude, climate, control of insect pests and vintage year, great differences are observed in the quality and aroma of the grapes and of the resulting wine.

Wines contain usually two to four times the percentage of alcohol present in malt liquors, but are much lower in carbohydrates. As a matter of fact, many of the ordinary wines, such as Claret and Moselle wines, are practically free from carbohydrates. Sweet wines, of course, have a considerably higher carbohydrate content.

Yeast cannot produce more than about 14 per cent alcohol in any saccharine fluid—even if additional sugar is present. The term "*dry*," in contrast to "*sweet*," refers solely to the degree of sweetness presented to the taste, a "dry" wine being less sweet than a "sweet" wine.

For classification, wines may be subdivided as follows:

Acid Wines.—All wines contain tartaric, lactic and other acids. They vary greatly as to the quantity of their acid content, Moselle wines being the most acid. Like most vegetable products, wines have, in spite of their acid taste, an alkaline ash. The following wines are arranged in the order of their increasing acidity: Sherry,

port, claret, madeira, burgundy, sauternes, rhine and moselle wine. Often the most acid wines are also the ones lowest in carbohydrate.

Aromatic Wines.—Certain species of grapes, such as muscatel, traminer, etc., are exceedingly pronounced in flavor and transmit their aroma to the wine. Other wines, principally Italian vermouth, dubonnet, etc., are prepared from wines with the addition of various condiments, such as cinnamon, which lend their characteristic flavor to the wine.

"Perfect" Wines.—Wines from Bordeaux, Sauternes and the Rhine are of excellent flavor and quality. They are esteemed by connoisseurs all over the world as table wines because of their mild, agreeable taste and effect. It would fill volumes to enumerate all of the names found on the labels of these popular wines, each small village insisting on prominent display of its name on the labels of the bottles, often even stating in addition the name of the exact location of the vineyard from which the grapes have been harvested.

Rough or Astringent Wines.—These are usually red wines, which are characterized by the presence of tannin substances, derived mainly from the grape skins, and, therefore, are considered to be slightly constipating. Claret and Burgundy are typical red wines.

Sparkling Wines.—Sparkling wines (champagne, sparkling burgundy, etc.) were originated in France, but now are produced from the wines of many countries either by bottle fermentation (natural) or by the impregnation (artificial) of the wine with carbon dioxide. All degrees of sweetness can be obtained in champagnes, from the "dryest" to the sweetest.

Strong Wines (Fortified Wines).—Port and sherry are wines which are produced by adding distilled liquor, usually either pure alcohol or young brandy, to the fully or partially fermented grape juice. Depending upon the amount of residual sugar present in the wine when the distillate is added, either dry or sweet sherry or port wines are obtained. Sometimes evaporated (sun-dried) grape juices are added to obtain sweetness. Exceedingly warm storage of the sherry or port wines is also responsible for the characteristic taste of these wines. Malaga and madeira wines are also frequently fortified.

Distilled Liquors.—Distilled liquors owe their stimulating action to the high percentage of the alcohol present. Other ingredients, like the sugar contained in cordials and the oil of peppermint contained in Crême de Menthe, sometimes are present and tend to make the combination of components more agreeable to the senses. Liquors are made in what seems to be an almost uncountable variety of tastes and flavors. Some of the distilled liquors are only used as flavoring agents, such as bitters (orange bitters), etc.

Distilled liquors usually have an alcohol content of 20 to 40 per cent by weight; in some cases though, they are not consumed at such strength. In highballs and cocktails distilled liquors are consumed, because of their mixture with water or other diluents, in such a diluted condition that their alcoholic concentration is often similar to that of wine.

For certain distilled liquors, principally whiskies, brandies and rums, several years of aging are required to develop the proper flavor and appeal. In the case of rye and bourbon whiskies, the type of wood used for the barrel in which the liquor is aged and the degree of charring applied to the barrel have an important effect on the flavor of the liquor produced. Tannin and coloring substances, wood caramel products and soluble wood components contribute a great proportion of the flavor finally present. For liquors made from pure 95 per cent alcohol, such as most of the cordials, no aging is required, the beverage being ready for consumption soon after adding the flavoring and compounding.

Distillates from Fermented Fruit Juices.—The distillate from grape wine is designated as brandy or cognac, the distillate from cider is applejack or apple brandy, the distillate from fermented plums is plum brandy, from fermented cherries is white cherry brandy, etc.

Distillates from Fermented Saccharine Solutions.—The distillate from fermented sugar cane juice or molasses is known as rum; the distillate from palm wine is called arrac, highly esteemed as an addition to hot tea. Scotch whiskey is distilled from the fermented infusion of a specially aromatized (smoky) barley malt; rye whiskey is distilled from the fermented infusion of barley malt, rye malt and rye; bourbon whiskey is distilled from the fermented infusion of malt and corn; Irish whiskey exists in two varieties, one of which is distilled from potatoes and is considered a cheap type of whiskey, the other is very similar to Scotch whiskey and likewise is made from barley malt.

Distillates from Alcoholic Infusions of Aromatic Seeds and Herbs.—When aromatic substances like caraway seeds, juniper berries, anise seeds, mint, orange peels, etc., are steeped in a mixture of rectified alcohol and water and are distilled, the distillates contain the respective flavor and represent such liquors as kümmel, gin, aquavit, anise, etc. Sometimes sugar, coloring matter of additional flavoring substances, such as alcoholic fluid extracts of angelica, cocoa, vermouth, etc., are being added to the distillate, and either bitters or cordials, such as crême de menthe, crême de cacao, curaçao, anisette, benedictine, etc., are obtained. If fresh fruits are sweetened and macerated in the presence of pure alcohol, the filtrate represents such "fine cordials" as cherry brandy, apricot brandy, etc. Eggnog is the sweetened mixture of brandy with the yolk of egg. Sweet cordials are taken usually after dinner.

COMPOSITION AND FUEL VALUES OF ALCOHOLIC BEVERAGES.

Introduction. In evaluating the caloric intake of the individual, his alcoholic habits should be taken into consideration. It is for the convenience of the nutritionist that this table has been elaborated. It provides in readily available form authentic data on the composition of various alcoholic preparations. This should enable

a physician to discuss these matters competently or to prescribe intelligently those beverages which are desirable.

The following table contains the composition and fuel values of almost all internationally known alcoholic beverages. With few exceptions trade-marked products have been omitted. These analyses are of most recent date and are offered with an assurance of their accuracy.

Marked variations of composition are found in any one of the enumerated beverages, consequently only average values are presented.

The **boldface numerals** indicate the number of grams and Calories in an average portion. The *plain numerals* indicate the percentage composition thereof in weight per cent.

Table 57.—**Beverage Glass Equivalents.**

1 Cordial glass (fluid)	=	20 cc.
1 Brandy glass (fluid)	=	30 cc.
1 Sherry glass (fluid)	=	30 cc.
1 Wine glass (fluid)	=	100 cc.
1 Cup* (fluid)	=	236 cc.

Table 58. **Composition and Fuel Values of Alcoholic Beverages** †

Items.	Size of portion. Grams.	Household measure.	Value of portion. Alcohol.	Carb.	Prot.	Fat.	Cal.
I. **Malt Liquors:**‡							
A. *American:*							
Ale, cream ale, carbonated ale	230	1 cup	**8.9**	**8.0**	**1.1**	**—**	**100**
			3.8	3.5	0.5	—	
Bock beer	230	1 cup	**10.3**	**13.8**	**1.6**	**—**	**135**
			4.5	6.0	0.7	—	
Lager beer (draught or bottle)	230	1 cup	**8.5**	**9.2**	**1.1**	**—**	**100**
			3.7	4.0	0.5	—	
Porter, stout . . .	230	1 cup	**13.8**	**11.5**	**1.3**	**—**	**150**
			6.0	5.0	0.6	—	
Stock ale, still ale, India ale . . .	230	1 cup	**13.8**	**11.5**	**1.3**	**—**	**150**
			6.0	5.0	0.6	—	
"3.2" beer	230	1 cup	**6.9**	**6.9**	**1.1**	**—**	**80**
			3.0	3.0	0.5	—	
B. *European:*							
Ale, porter, stout, English for export . .	230	1 cup	**13.8**	**11.5**	**1.3**	**—**	**150**
			6.0	5.0	0.6	—	
Bock beer and related special beers . .	230	1 cup	**10.3**	**13.8**	**1.8**	**—**	**135**
			4.5	6.0	0.8	—	
Lager beers, Central European, average quality	230	1 cup	**8.5**	**9.2**	**1.1**	**—**	**100**
			3.7	4.0	0.5	—	
Munich beer (usually dark)	230	1 cup	**8.0**	**10.3**	**1.3**	**—**	**105**
			3.5	4.5	0.6	—	

* The cup referred to is the "Standard Measuring Cup."

† Furnished by "Jacob Ruppert," New York.

‡ Malt liquors usually contain about 0.2 per cent lactic acid and acid phosphates, also 0.4 per cent by weight of carbon dioxide. There is also present about 0.2 per cent mineral salts. In general, the alcoholic percentage by weight of all malt liquors varies from 1.5 to 7 per cent.

— Indicates negligible or absent.

TABLE 58. **Composition and Fuel Values of Alcoholic Beverages.** *(Continued.)*

Items.	Size of portion. Grams.	Household measure.	Value of portion. Alcohol.	Carb.	Prot.	Fat.	Cal.
I. **Malt Liquors:**—(Continued.)							
Pilsener beer (always light)	230	1 cup	**8.9**	**8.0**	**1.1**	—	**100**
			3.8	3.5	0.5	—	
Salvator, Maerzen beers	230	1 cup	**10.3**	**13.8**	**1.8**	—	**135**
			4.5	6.0	0.8	—	
Weiss beer . . .	230	1 cup	**4.6**	**4.6**	**1.1**	—	**55**
			2.0	2.0	0.5	—	
II. **Wines:**‡							
A. *American:*							
California red wines, claret, Zinfandel, Chianti, Burgundy, etc.	100	Wine glass	**10.0**	**0.5**	**0.2**	—	**75**
			10.0	0.5	0.2	—	
California white wines, Chablis, Riesling, Rhine	100	Wine glass	**10.5**	**0.5**	**0.2**	—	**75**
			10.5	0.5	0.2	—	
California white wine, sauterne . . .	100	Wine glass	**10.5**	**4.0**	**0.2**	—	**90**
			10.5	4.0	0.2	—	
Champagne from California and New York State	100	Wine glass	**11.0**	**3.0**	**0.2**	—	**90**
			11.0	3.0	0.2	—	
Sweet and dessert wines:							
Catawba (white) .	100	Wine glass	**13.0**	**12.0**	**0.2**	—	**140**
			13.0	12.0	0.2	—	
Muscatelle . . .	100	Wine glass	**15.0**	**14.0**	**0.2**	—	**165**
			15.0	14.0	0.2	—	
Port	100	Wine glass	**15.0**	**14.0**	**0.3**	—	**165**
			15.0	14.0	0.3	—	
Sherry	100	Wine glass	**15.0**	**8.0**	**0.3**	—	**140**
			15.0	8.0	0.3	—	
B. *European:*							
Bordeaux wine (French) . . .	100	Wine glass	**10.5**	**2.0**	**0.2**	—	**80**
			10.5	2.0	0.2	—	
Champagne, white, dry	100	Wine glass	**11.5**	**1.0**	**0.2**	—	**85**
			11.5	1.0	[illegible]	—	
Champagne, white, sweet	100	Wine glass	**11.0**	**10.0**	**0.2**	—	**120**
			11.0	10.0	0.2		
Claret (red), French, Italian or Spanish .	100	Wine glass	**8.0**	**0.5**	**0.2**	—	**60**
			8.0	0.5	0.2	—	
Madeira wine . . .	100	Wine glass	**14.0**	**3.0**	**0.2**	—	**110**
			14.0	3.0	0.2		
Moselle wine (German)	100	Wine glass	**8.5**	**0.5**	**0.2**	—	**60**
			8.5	0.5	0.2	—	
Rhine wine (German, like Hockheimer "hock")	100	Wine glass	**9.5**	**1.0**	**0.2**	—	**70**
			9.5	1.0	0.2	—	

‡ Wines contain from 6 to 20 per cent of alcohol by weight, depending upon the variety. They usually contain [illegible] per cent acidity from tartaric, lactic and phosphoric acids; also [illegible] per cent mineral salts. Additionally, they contain [illegible] per cent of glycerine. Red wines contain [illegible] per cent tannin.

— indicates negligible or absent.

TABLE 58.—Composition and Fuel Values of Alcoholic Beverages. (*Continued.*)

Items.	Size of portion: Grams.	Size of portion: Household measure.	Value of portion: Alcohol.	Carb.	Prot.	Fat.	Cal.
II. **Wines:**—(Continued.)							
Sauterne wine (French)	100	Wine glass	**10.5**	**2.0**	**0.2**	**—**	**80**
			10.5	2.0	0.2	—	
Sweet and Dessert Wines:							
Malaga (Spanish) .	100	Wine glass	**10.5**	**20.0**	**0.3**	**—**	**155**
			10.5	20.0	0.3	—	
Marsala, Malvasia, Lacrimæ Christi Italian) . . .	100	Wine glass	**12.0**	**5.0**	**0.3**	**—**	**110**
			12.0	5.0	0.3	—	
Port wine (Portuguese), Douro .	100	Wine glass	**15.0**	**6.0**	**0.3**	**—**	**130**
			15.0	6.0	0.3	—	
Sherry, Amontillado, Tarragona, etc. .	100	Wine glass	**15.0**	**3.0**	**0.3**	**—**	**120**
			15.0	3.0	0.3	—	
Tokay (Hungarian)	100	Wine glass	**10.0**	**12.0**	**0.3**	**—**	**120**
			10.0	12.0	0.3	—	
Vermouth (French)[1] .	100	Wine glass	**15.0**	**1.0**	**—**	**—**	**110**
			15.0	1.0	—	—	
Vermouth (Italian), Dubonnet, etc.[1] .	100	Wine glass	**18.0**	**12.0**	**—**	**—**	**175**
			18.0	12.0	—	—	
III. **Distilled Liquors:**‡							
Absinthe (Swiss) . .	20	Cordial glass	**7.0**	**—**	**—**	**—**	**50**
			35.0	—	—	—	
Akvavit (Norwegian)	20	Cordial glass	**7.0**	**0.2**	**—**	**—**	**50**
			35.0	1.0	—	—	
Applejack	30	Brandy glass	**10.5**	**—**	**—**	**—**	**75**
			35.0	—	—	—	
Arrac (Palm wine district)	20	Cordial glass	**7.0**	**—**	**—**	**—**	**50**
			35.0	—	—	—	
Bacardi rum . . .	30	Brandy glass	**10.5**	**—**	**—**	**—**	**75**
			35.0	—	—	—	
Bitters: Angostura, orange, Boonekamp, etc.	4	1 teaspoon	**1.4**	**—**	**—**	**—**	**10**
			35.0	—	—	—	
Brandy, apple . .	30	Brandy glass	**10.5**	**—**	**—**	**—**	**75**
			35.0	—	—	—	
Brandy, apricot . .	30	Brandy glass	**9.0**	**—**	**—**	**—**	**65**
			30.0	—	—	—	
Brandy, California .	30	Brandy glass	**10.5**	**—**	**—**	**—**	**75**
			35.0	—	—	—	
Brandy, cherry . .	30	Brandy glass	**13.2**	**—**	**—**	**—**	**90**
			44.0	—	—	—	
Brandy, cognac (French)	30	Brandy glass	**10.5**	**—**	**—**	**—**	**75**
			35.0	—	—	—	
Gin, dry	30	Brandy glass	**10.5**	—	—	—	**75**
			35.0	—	—	—	

[1] Vermouth and Dubonnet contain extracts of herbs, giving them distinctive properties.

‡ Liquors contain from [illegible] to 50 per cent alcohol, depending upon the variety. They usually contain less than 0.1 per cent fusel oils. Liquors made from high rectified alcohol are free of fusel oils. Esters and essential oils amount to less than 0.3 per cent and acids less than 0.1 per cent.

— indicates negligible or absent.

TABLE 58. Composition and Fuel Values of Alcoholic Beverages. (*Continued.*)

Items.	Size of portion.		Value of portion.				
	Grams.	Household measure.	Alcohol.	Carb.	Prot.	Fat.	Cal.
III. **Distilled Liquors:** (Continued.)							
Kirschwasser	20	Cordial glass	7.0	—	—	—	50
			35.0	—	—	—	
Liqueurs, Cordials:							
Anisette	20	Cordial glass	7.0	7.0	—	—	80
			35.0	35.0	—	—	
Apricot brandy	20	Cordial glass	6.0	6.0	—	—	65
			30.0	30.0	—	—	
Benedictine	20	Cordial glass	6.6	6.6	—	—	75
			33.0	33.0	—	—	
Chartreuse	20	Cordial glass	6.6	6.6	—	—	75
			33.0	33.0	—	—	
Cherry brandy	20	Cordial glass	4.6	6.0	—	—	55
			23.0	30.0	—	—	
Crême apricot	20	Cordial glass	6.0	6.0	—	—	65
			30.0	30.0	—	—	
Crême de cacao	20	Cordial glass	4.0	6.0	—	—	50
			20.0	30.0	—	—	
Crême de menthe	20	Cordial glass	6.0	7.0	—	—	70
			30.0	35.0	—	—	
Crême de Violette	20	Cordial glass	6.0	6.0	—	—	65
			30.0	30.0	—	—	
Crême Yvette	20	Cordial glass	6.0	6.0	—	—	65
			30.0	30.0	—	—	
Curaçao (orange peel)	20	Cordial glass	6.0	4.0	—	—	60
			30.0	20.0	—	—	
Kümmel (caraway seed)	20	Cordial glass	6.0	2.0	—	—	50
			30.0	10.0	—	—	
Maraschino (cherry)	20	Cordial glass	6.0	8.0	—	—	75
			30.0	40.0	—	—	
Swedish punch	20	Cordial glass	6.0	5.0	—	—	60
			30.0	25.0	—	—	
Rum, Jamaica, Martinique	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	
Sloe gin	30	Brandy glass	8.4	4.5	—	—	75
			28.0	15.0	—	—	
Vodka	20	Cordial glass	9.0	—	—	—	65
			45.0	—	—	—	
Whiskies: Bourbon	30	Brandy glass	12.0	—	—	—	85
			40.0	—	—	—	
Irish	30	Brandy glass	12.0	—	—	—	85
			40.0	—	—	—	
Rye	30	Brandy glass	12.0	—	—	—	85
			40.0	—	—	—	
Scotch	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	
IV. **Miscellaneous:**							
Cider, American:							
Sweet	230	1 cup	0.2	21.1	—	—	100
			[illegible]	[illegible]	—	—	
Fermented (hard)	100	Wine glass	5.2	1.0	—	—	40
			5.2	1.0	—	—	
Grenadine syrup	20	Cordial glass	—	12.0	—	—	50
			—	60.0	—	—	
Maraschino cherry juice	5	1 teaspoon	—	1.8	—	—	7
			—	36.0	—	—	
Raspberry syrup	20	Cordial glass	—	12.0	—	—	50
			—	60.0	—	—	

— indicates negligible or absent.

At times, it is essential for the physician to be conversant with the constituents of mixed alcoholic beverages. This is particularly necessary for the practitioner in a large city or for one practising among a foreign element. Table 59 presents qualitative ingredients of the various common, mixed alcoholic beverages. Efforts have been made to delete purely local or fanciful mixtures or those of temporary vogue.

TABLE 59.—Qualitative Ingredients of Mixed Alcoholic Beverages.*

Cocktails: These are iced and diluted mixtures of distilled liquors with fruit juices or certain wines (Vermouth, etc.).

Absinthe: Absinthe, water, syrup, Angostura bitters.
Alexander: Gin, crême de cacao, cream.
Applejack: Applejack, grenadine, lemon juice.
Astoria: Gin, French vermouth, orange bitters.
Bacardi: Bacardi rum, grenadine, lime juice.
Brandy: Brandy, gin, Angostura bitters.
Bronx: Gin, French or Italian vermouth, orange juice.
Champagne: Champagne, sugar, Angostura bitters, slice of orange, lemon peel.
Clover Club: Gin, raspberry syrup, lemon juice, egg-white.
Daiquiri: Bacardi rum, sugar, lemon or lime juice.
Dubonnet: Gin, Dubonnet, orange bitters.
El Presidente: Bacardi rum, French vermouth, grenadine, Curaçao.
Gin: Gin, orange bitters.
Grapefruit: Gin, grapefruit juice, lemon juice.
Havana: Bacardi rum, pineapple juice.
Ideal: Gin, Italian vermouth, maraschino, grapefruit juice.
Jack Rose: Applejack, grenadine, lime juice.
Jockey Club: Gin, crême de noyau, Angostura bitters, orange bitters, lemon juice.
Manhattan: Rye whiskey, Italian vermouth, Angostura bitters.
Martell: Martell brandy, honey, lime juice.
Martini, Dry: Gin, French vermouth.
Martini, Sweet: Gin, Italian vermouth, orange bitters.
Merry Widow: Gin, French vermouth, absinthe, benedictine, Angostura bitters.
Old-fashioned: Rye whiskey, Angostura bitters, sugar, seltzer.
Orange Blossom: Gin, orange juice.
Paradise: Gin, apricot brandy, orange juice.
Perfect: Gin, French and Italian vermouth.
Pink Lady: Applejack, gin, grenadine, lime juice, egg-white.
Princess: Apricot brandy, sweet cream.
Salome: Gin, French vermouth, Dubonnet.
Sidecar: Brandy, cointreau, lime juice.
Sloe Gin: Sloe gin, French and Italian vermouth.
Soul Kiss: French and Italian vermouth, Dubonnet, orange juice.
Tom and Jerry: Brandy, rum, egg, sugar.
Whiskey Sour: Rye whiskey, sugar, lemon juice.

Cobblers: Mixtures of wines or whiskey with fruit juices, sugar and non-alcoholic diluents.

Brandy: Brandy, fruit, sugar, seltzer.
Claret: Claret, fruit, sugar, seltzer.
Port: Port wine, fruit, sugar, seltzer.

— indicates negligible or absent.
* The compositions and fuel values of mixed alcoholic beverages necessarily vary greatly and are not capable of reliable analytical presentation.

TABLE 59.—Qualitative Ingredients of Mixed Alcoholic Beverages. (*Continued.*)

Cobblers:—(Continued.)

Rhine: Rhine wine, fruit, sugar, seltzer.
Sherry: Sherry wine, fruit, sugar, seltzer.
Whiskey: Whiskey, fruit, sugar, seltzer.

Collins: Mixtures of gin, fruit juices, sugar and non-alcoholic diluents.

Tom Collins: Gin, lemon juice, sugar, seltzer.
John Collins: Hollands gin, lemon juice, sugar, seltzer.

Eggnogs: Mixtures of distilled liquors, eggs, milk and sugar.

Brandy: Brandy, rum, whole egg, milk, sugar.
Rye: Rye whiskey, whole egg, milk, sugar.
Scotch: Scotch whiskey, whole egg, milk, sugar.
Sherry: Sherry wine, rum, whole egg, milk, sugar.

Fizzes: Mixtures of gin or brandy, fruit juices, eggs, sugar and non-alcoholic diluents.

Brandy: Brandy, lemon juice, sugar, seltzer.
Gin: Gin, lemon juice, sugar, seltzer.
Golden: Gin, egg-yolk, lemon juice, sugar, seltzer.
Grenadine: Gin, grenadine, lemon juice, sugar, milk, seltzer.
New Orleans: Gin, egg-white, orange flower water, sugar, cream, seltzer.
Royal: Gin, whole egg, lemon juice, sugar, seltzer.
Silver: Gin, egg-white, lemon juice, sugar, seltzer.
Sloe Gin: Sloe gin, lemon juice, sugar, seltzer.

Flips: Mixtures of distilled liquors, eggs, sugar and nutmeg.

Brandy: Brandy, whole egg, sugar, nutmeg.
Port: Port wine, whole egg, sugar, nutmeg.
Sherry: Sherry wine, whole egg, sugar, nutmeg.
Whiskey: Scotch or rye whiskey, whole egg, sugar, nutmeg.

Highballs: Mixtures of distilled liquors and non-alcoholic diluents.

Bourbon: Bourbon whiskey, seltzer or ginger ale.
Gin: Gin, seltzer or ginger ale.
Rye: Rye whiskey, seltzer or ginger ale.
Scotch: Scotch whiskey, seltzer or ginger ale.

Rickeys: Mixtures of gin, lime juice and non-alcoholic diluents.

Gin: Gin, lime juice, seltzer.
Puerto Rico: Gin, grenadine, lime juice, seltzer.
Sloe Gin: Sloe gin, lime juice, seltzer.

Sours: Mixtures of distilled liquors, lemon juice, sugar and non-alcoholic diluents.

Applejack: Applejack, lemon juice, sugar, seltzer.
Bourbon: Bourbon whiskey, lemon juice, sugar, seltzer.
Brandy: Brandy, lemon juice, sugar, seltzer.
Gin: Gin, lemon juice, sugar, seltzer.
Rye: Rye whiskey, lemon juice, sugar, seltzer.
Scotch: Scotch whiskey, lemon juice, sugar, seltzer.

Fancy Drinks:

Horses Neck: Ginger ale, lemon peel.
Mamie Taylor: Scotch whiskey, lime juice, ginger ale.
Mint Julep: Bourbon whiskey, water, sugar, mint sprigs.
Planters Punch: Jamaica rum, grenadine, Curaçao, lemon juice.
Whiskey Punch: Whiskey, water, sugar, lemon juice.
Whiskey Smash: Whiskey, water, sugar, mint sprigs.
White Plush: Rye whiskey, maraschino, whole egg, milk.
Widow's Dream: Benedictine, whole egg, cream.

Pousse Cafés:

Cream: Maraschino, crême de menthe, yellow chartreuse, brandy.
Cream: Raspberry syrup, anisette, crême Yvette, yellow chartreuse, green chartreuse, brandy.

TABLE 60. Sodium and Potassium Content of Municipal Water Supplies.*

Place	Na (*mg. per 100 cc*)	K (*mg. per 100 cc*)
Aberdeen, S. D.	20	2.
Albany, N. Y.	0.2	0.2
Albuquerque, N. M.	5	0.7
Allentown, Pa.	0.4	0.3
Annapolis, Md.	0.2	0.2
Ann Arbor, Mich.	2	0.5
Atlanta, Ga.	0.2	0.2
Augusta, Me.	0.2	0.2
Austin, Texas	3	0.5
Baltimore, Md.	0.3	0.2
Bangor, Me.	0.2	0.1
Baton Rouge, La.	9	0.2
Beloit, Wis.	0.5	0.2
Billings, Mont.	1.	0.2
Biloxi, Miss.	23.	0.6
Birmingham, Ala.	2.	0.3
Bismarck, N. D.	6.	0.6
Boise, Idaho	2.	0.3
Boston, Mass.	0.3	0.2
Brownsville, Texas	6.	0.3
Brownswood, Texas	2.	0.4
Buffalo, N. Y.	0.7	0.3
Burlington, Vt.	0.2	0.1
Butte, Mont.	0.6	0.4
Camden, N. J.	0.9	0.3
Carson City, Nev.	0.4	0.3
Charleston, S. C.	1	0.3
Charleston, W. Va.	0.3	0.2
Charlotte, N. C.	0.3	0.1
Charlottesville, Va.	0.2	0.1
Cheyenne, Wyo.	0.3	0.2
Chicago, Ill.	0.3	0.1
Cincinnati, Ohio	0.7	0.3
Cleveland, Ohio	1	0.3
Columbia, S. C.	0.4	0.2
Columbus, Ohio	5	0.6
Concord, N. H.	0.2	0.1
Corpus Christi, Texas	15	0.6
Crandall, Texas	170 **	0.5
Dallas, Texas	3	0.5
Dayton, Ohio	0.7	0.2
Denver, Colo.	3	0.2
Des Moines, Iowa	1	0.4
Detroit, Mich.	0.3	0.1
Dover, Del.	2	0.5
Durham, N. C.	0.4	0.2
El Paso, Texas	7	0.6
Emporia, Kans.	1	0.3
Eureka, Calif.	0.7	0.6
Evansville, Ind.	2.	0.5
Fargo, N. D.	5.	0.7
Flint, Mich.	2	0.2
Frankfort, Ky.	0.3	0.1
Galesburg, Ill.	30.	2
Galveston, Texas	34	0.7
Grand Forks, N. D.	6	0.4
Hamilton, Ohio	3.	0.2
Harrisburg, Pa.	0.2	0.1
Hartford, Conn.	0.2	0.1
Helena, Mont.	0.3	0.2
Houston, Texas	16	0.6
Huntington, W. Va.	3.	0.2
Independence, Mo.	9.	0.5
Indianapolis, Ind.	1.	0.3
Iowa City, Iowa	0.5	0.3
Jackson, Mich.	5.	0.3
Jackson, Miss.	0.4	0.2
Jacksonville, Fla.	1.	0.2
Jefferson City, Mo.	3.	0.4
Jersey City, N. J.	0.3	0.2
Joplin, Mo.	0.5	0.1
Kalamazoo, Mich.	0.7	0.3
Kansas City, Kans.	4.	0.4
Kansas City, Mo.	10.	3.
Lancaster, Pa.	0.4	0.1
Lansing, Mich.	1.	0.5
Lawrence, Kans.	4.	0.7
Lincoln, Neb.	3.	0.7
Little Rock, Ark.	0.1	0.1
Los Angeles, Calif.		
Aqueduct source	6.	0.6
Metropolitan source	17.	0.5
River source	5.	0.5
Louisville, Ky.	2.	0.3
Madison, Wis.	0.4	0.2
Manchester, N. H.	0.2	0.1
Marion, Ohio	17.	0.7
Memphis, Tenn.	2.	0.3
Miami, Fla.	2.	0.3
Middletown, Ohio	0.8	0.1
Milwaukee, Wis.	0.3	0.1
Minneapolis, Minn.	0.5	0.3
Minot, N. D.	25.	0.6
Moberly, Mo.	0.3	0.2
Montgomery, Ala.	0.8	0.1
Montpelier, Vt.	0.1	0.1
Nashville, Tenn.	0.3	0.2
Newark, N. J.	0.2	0.1
New Haven, Conn.	0.3	0.1
New Orleans, La.	1.	0.4
New York, N. Y.	0.3	0.2
Oakland, Calif.	0.3	0.1
Oklahoma City, Okla.	10.	0.8
Olympia, Wash.	0.5	0.3
Omaha, Neb.	8.	1.
Philadelphia, Pa.	2.	0.4
Phoenix, Ariz.	11.	0.7
Pierre, S. D.	9.	0.5
Pittsburg, Pa.	6.	0.5
Portland, Me.	0.2	0.1
Portland, Ore.	0.1	0.1
Providence, R. I.	0.2	0.1
Raleigh, N. C.	0.4	0.1
Reno, Nev.	0.5	0.1
Richmond, Va.	0.7	0.2
Rochester, Minn.	0.7	0.2
Rochester, N. Y.	0.3	0.2
Rockford, Ill.	0.7	0.2
Sacramento, Calif.	0.3	0.2
Sante Fe, N. M.	0.4	0.1
St. Joseph, Mo.	9.	0.6
St. Louis, Mo.	5	0.5

* Bills, C. E., McDonald, F. G., Neidermeier, W., and Schwartz, M. C., J. Am. Dietet. Assn., **25**, 304, 1949.

** Extreme example this water rarely drunk, but is used for cooking.

Table 60. Sodium and Potassium Content of Municipal Water Supplies. *Continued*

Place	Na mg. per 100 cc	K mg. per 100 cc
St. Paul, Minn.	0.5	0.3
St. Petersburg, Fla.	0.5	0.1
Salem, Ore.	0.2	0.1
Salt Lake City, Utah	0.8	0.2
San Angelo, Texas	5.	0.9
San Antonio, Texas	1.	0.1
San Diego, Calif.	5.	0.5
San Francisco, Calif.	1.	0.3
Santa Barbara, Calif.	10	0.3
Seattle, Wash.	0.2	0.1
Sedalia, Mo.	0.3	0.2
Shreveport, La.	2.	0.1
Sioux Falls, S. D.	1.	0.4
Springfield, Ill.	0.8	0.3
Springfield, Mo.	0.4	0.2
Syracuse, N. Y.	0.2	0.1
Tallahassee, Fla.	0.3	0.1
Tampa, Fla.	0.5	0.1
Texarkana, Ark.	3.	0.2
Topeka, Kans.	1.	0.5
Trenton, N. J.	0.1	0.1
Tucson, Ariz.	3.	0.3
Tulsa, Okla.	0.3	0.4
Uniontown, Pa.	0.2	0.1
Upper Darby, Pa.	0.4	0.2
Washington, D. C.	0.3	0.3
Whittier, Calif.	1.	0.2
Wichita, Kans.	5.	0.5
Wilkes-Barre, Pa.	0.2	0.1
Wilmington, Del.	0.8	0.1
Winona, Minn.	5.	0.4

Table 61. Sodium and Potassium Content of Representative Foods*

Food items.**	Na mg. per cent	K mg. per cent
All-Bran, cereal	1400	1200
Allspice	62	680
Almonds, raw	3	690
Roasted in oil, salted	160	710
Anchovy paste	9800	200
Apples		
Juice (sweet cider) bottled	4	100
June, less skin and core	0.1	71
Mackintosh, less skin and core	0.2	90
Red Delicious, less skin and core	0.3	76
Sauce, canned	0.3	55
Apricots		
Canned in sirup	2	65
Dried	11	1700
Raw, with skin	0.6	440
Artichokes, globe	43	430
Asparagus		
Spears, canned	410	130
Tips, fresh	2	240
frozen	3	320
Avocado	3	340
Bacon, fried crisp	2400	390
Raw	680	110
Baking powder		
Alum type	10,000	150
Phosphate type	9000	170
Tartrate type	7300	5000
Bananas	0.5	420
Barley, pearled	3	160
Beans		
Baked, Heinz, navy with pork and tomato sauce, canned	480	210
Beans		
Baked, with tomato sauce, canned	400	140
Dry navy	1	1300
Green in pods, canned	410	120
fresh	0.9	300
frozen	2	110
Lima		
canned	310	210
fresh	1	680
frozen	310	580
Beef		
Corned	1300	60
Dried	4300	200
Lean, koshered, raw	1600	290
Lean, raw	51	360
Beer	8	46
Beets		
Canned	36	120
Greens, fresh	130	570
Raw	110	350
Blackberries	0.2	150
Blueberries	0.6	89
Bouillon cube	24,000	100
Brain, pig	150	340
Bran, wheat, crude	15	980
Brandy	3	4
Brazil nuts, raw	1	670
Roasted in oil, salted	190	730
Bread		
Boston brown with raisins	280	360
Low-sodium, 4 laboratory samples	3	94
Low-sodium cinnamon roll, lab. sample	2	120

* Bills, C. E., McDonald, F. G., Neidermeier, W., and Schwartz, M. C., J. Am. Dietet. Assn., **25**, 304, 1949.

** Analyses made on edible portions of unprocessed foods except as otherwise designated.

Food items **	Na *mg per cent*	K *mg per cent*
Bread		
Low-sodium, 14 commercial "salt-free" breads		
Maximum	76	200
Minimum	4	72
Average	28	120
Passover, see Matzoth		
Rye and wheat	590	160
White, enriched	640	180
Whole wheat	930	230
Whole wheat and white	620	250
Broccoli, fresh	16	400
frozen	13	250
Brussels sprouts, fresh	11	450
frozen	9	300
Butter		
Theoretical value based on U. S. aver. salt content of 2.5%	980	
4 Indiana samples	880	23
Unsalted	5	4
Buttermilk, cultured	130	140
Cabbage	5	230
Candy		
Bar, Baby Ruth	170	300
Milky Way	220	150
Oh Henry	76	420
Gum drops	11	18
Marshmallows	11	6
Milk Chocolate	86	420
Necco wafers	5	2
Peppermint patty, Schrafft's	10	110
Sweet chocolate	35	230
Cantaloupe	12	230
Caraway seeds	17	1400
Carbonated beverages, see Soft drinks		
Carrots, canned	280	110
Scraped and trimmed, raw	31	410
Casein		
Acid washed	0 4	2
Low-ash commercial	13	39
Vitamin-free	160	900
Cashew nuts, raw	14	560
Roasted in oil, salted	200	560
Catsup, tomato	1300	800
Catfish (fiddler), Ohio River	60	330
Cauliflower buds, fresh	24	400
Frozen	[illegible]	290
Caviar, salmon, canned	2200	180
Celery		
Salt	28,000	380
Seed	140	1400
Stalks, less leaves	110	300
Cereals, dry		
Bran		
All-bran	1400	1200
Crude, unsalted	15	980
Corn flakes	660	160

Food items. **	*Na* *mg. per cent*	*K* *mg. per cent*
Cereals, dry		
Farina		
Cream of Wheat, plain	2	86
Cream of Wheat, quick cooking, enriched	90	84
Grape-Nuts	660	230
Pabena	640	340
Pablum	620	380
Rice flakes	720	180
puffed	0 9	100
Rolled oats	2	340
Ry-Krisp	1500	600
Wheat		
Flakes	1300	320
Germ, malt-flavored, *Zing*	9	780
Instant Ralston	1	360
Maltex	4	250
Muffets	4	300
Pettijohn's	2	380
Puffed	4	340
Shredded	2	330
Wheatena	2	380
Certo (*pectin solution*)	15	110
Chard, lg. leaves	210	720
Small leaves	84	380
Cheese		
American Swiss	710	100
Cheddar	700	92
Cottage	290	72
Cream, Philadelphia	250	74
Process	1500	80
Whey, *Velveeta*	1600	270
Cherries		
Sour, frozen in sirup	2	78
Sweet		
Dark, raw	1	260
canned in sirup	0 8	77
frozen in sirup	1	280
Light, canned in sirup	3	55
Chestnuts	2	410
Chicken, raw		
Breast meat	78	320
Leg meat	110	250
Chocolate, see also Candy		
Sirup, Hershey	60	130
Unsweetened	4	830
Cider, sweet, bottled	4	100
Cinnamon	8	200
Citron, candied	290	120
Clams	180	240
Cloves	210	1000
Coca-Cola	1	52
Cocoa, Dutch process	57	3200
Plain, Hershey	5	1400
Coconut		
Dry, shredded	16	770
Meat	29	320
Milk	53	190
Cod, raw	60	360
Frozen fillets	400	400
Salted, dried	[illegible]	[illegible]
Cod-liver oil	0 1	0

TABLE 61. Sodium and Potassium Content of Representative Foods
Continued

Food items.**	Na mg. per cent	K mg. per cent
Coffee		
Instant, *Nescafé*, dry	84	3100
Roasted, regular, dry	2	1600
Sanka (decaffeinated), dry	6	2000
Cookie, salt-free, *Betty Bakerite*	12	240
Corn		
Flakes	660	160
Meal, yellow, enriched, degerminated	0.7	120
Oil	0.2	0.1
Popcorn, popped, oiled,	3	240
salted	2000	240
Starch	4	4
Sweet		
White, canned	200	200
milk stage	0.3	240
Yellow, canned	210	200
frozen	9	190
milk stage	0.4	370
Yellow field, dry, 5 varieties	0.6	290
Cowpeas, fresh shelled	2	560
Crab, canned	1000	110
Crackers		
Graham	710	330
Ry-Krisp	1500	600
Soda	1100	120
Unsalted, Jewish, see Matzoth		
Cranberries, raw	1	65
Sauce, canned	1	17
Cream of tartar, theoretical value of pure	1	20,776
Cream, whipping, 32% fat	40	56
Crisco	4	0
Cucumbers, less parings	0.9	230
Currants, red	2	160
Zante, dried	22	730
Curry powder	45	1300
Dandelion greens	76	430
Dates, semi-dry, Calif.	1	790
Dextri-Maltose, No. 1	840	160
No. 2	46	160
No. 3	46	1300
B	52	360
Dextrin	14	14
Dextrose	1	0.4
Dill seed	13	1000
Duck, domesticated, raw		
Breast meat	68	360
Leg meat	96	210
Egg, hen's		
White only	110	100
Whole	81	100
Yolk	26	100
Eggplant, less skin	0.9	190
Endive, greens	18	400
Farina, see Cereals		
Figs, raw	2	190
Canned in sirup	1	105
Dried	34	780
Filberts (hazelnuts)	1	560
Flour		
Bleached		
Enriched, *Gold Medal*	1	86
Enriched, phosphated	13	78
Buckwheat	1	680
Gluten	2	24
Rye, dark	1	860
Self-rising	1500	90
Untreated, high-extraction	1	120
Whole wheat (Graham)	2	290
Fruit cocktail, canned in sirup	9	160
Garlic, less skin	6	510
Gelatin, plain	36	22
Dessert, *Jell-O*	330	210
Gin	0.7	0.3
Ginger	29	1100
Ale	8	0.6
Gizzard, turkey	58	170
Goose, raw		
Breast meat	76	420
Leg meat	96	420
Gooseberries, raw	0.7	87
Frozen	2	150
Grapes		
Concord, less seeds and skin	3	84
Emperor, less seeds, with skin	4	180
Jam	7	78
Juice, Concord, sweet, bottled	1	120
Thompson, seedless, with skin	4	180
Tokay, less seeds, with skin	0.7	160
Grapefruit, fresh	0.5	200
Juice, sweetened, canned	0.4	150
Sections, sweetened, frozen	5	60
Grape-Nuts	660	230
Gravy flavoring, *Kitchen Bouquet*	86	280
Gum (chewing), spearmint	22	27
Halibut, raw	56	540
Steak, frozen	460	500
Ham, raw	1100	340

** Analyses made on edible portions of unprocessed foods except as otherwise designated.

*Food items.***	*Na* *mg. per cent*	*K*
Hash, corned beef, canned	540	200
Hazelnuts (filberts)	1	560
Heart, beef	90	160
Turkey	69	240
Hominy, canned	250	22
Honey	7	10
Horseradish, prepared	96	290
Ice cream	100	90
Jam, grape	7	78
Kale, leaves and midribs	110	410
Kidney, beef	210	310
Kumquat, pulp and rind, less seeds	7	230
Lactalbumin	47	69
Lactose, U.S.P.	2	0
Lamb, raw		
Chop, lean	98	340
Leg, lean	78	380
Lard	0.3	0.2
Lemon		
Peel, candied	50	12
Fresh	9	360
Pulp and juice	0.7	130
Lentils, dry	3	1200
Lettuce, head	12	140
Leaf	7	230
Lime, pulp and juice	1	100
Litchi, dried	3	1100
Liver, raw, calf	110	380
Goose	140	230
Pig	77	350
Turkey	51	160
Lobsters, boiled in tap water	210	180
Lonalac, dry	13	1300
Macaroni, plain, dry	1	160
Mace	45	180
Maize, see Corn		
Maltex cereal, dry	4	250
Maple sirup	14	130
Marmalade, orange	13	19
Matzoth		
American-style, salted	470	120
Egg	16	160
Farfel (dough balls)	28	130
Meal	4	130
Passover bread	1	140
Plain	1	160
Poppy seed	350	110
Thin tea	2	130
Whole wheat	280	420
Mayonnaise	590	25
Meat extract, favored	11,000	6000
Milk, cow's		
Buttermilk, cult.	130	140
Condensed, sweetened	140	340
Evaporated	100	270
Fat	0.4	0.[illegible]
Skim	52	150
Whole dry	410	1100
Whole liquid	50	140
Milk, goat's	34	180
Human (from 10 mothers, 3 to 10 days postpartum)	37	68
(from 4 mothers, 49-77 days postpartum)	11	51
Milk, low-sodium, see *Lonalac*		
Milk, malted, dry	440	720
Molasses, cane	80	1500
Muffets	4	300
Mulberries	0.7	200
Mushrooms, canned	400	150
Raw	5	520
Mustard		
Greens	48	450
Powder	3	840
Prepared paste	1300	130
Nectarines, less skin	2	320
Nutmeg	14	160
Oats, rolled, dry	2	340
Okra, fresh	1	220
Oleomargarine	1100	58
Olives		
Green, pickled	2400	55
Oil	0.2	0.2
Ripe, pickled	980	23
Stuffed, pickled	2800	55
Onion, less tops and dry skin	1	130
Orange Crush	2	100
Oranges		
Juice, unsweetened, canned	0.5	190
Pulp and juice	0.3	170
Temple, pulp and juice	3	220
Oysters, raw	73	110
Pabena, cereal, dry	640	340
Pablum, cereal, dry	620	380
Pancreas, pig, raw	57	240
Paprika	82	2300
Parsley, fresh	28	880
Parsnips, scraped and trimmed, fresh	7	740
Peaches, canned in sirup	5	31
Dried	12	1100
Frozen in sirup	3	120
Raw, less skin	0.5	160
Peanuts		
Butter	120	820
Oil	0.2	0.1
Raw with skin	2	720
Roasted dry, with skin	2	740
In oil, salted, with skin	460	700
Pears, Bartlett		
Canned in sirup	8	52
Raw, less skin and core	2	100
Peas, canned, less liquid	270	96

TABLE 61. **Sodium and Potassium Content of Representative Foods**
Continued

Food items.**	Na mg. per cent	K mg. per cent
Peas, Dry, split	42	880
Fresh	1	370
Frozen	100	160
Pecans, raw	0.3	420
Pepper (spice), black	16	880
Red	46	2400
White	5	48
Peppermint extract	0.3	5
Peppers, green, empty pods	0.6	170
Pepsi-Cola	15	3
Persimmons, wild	0.6	310
Pettijohn's cereal, dry	2	380
Pickle, dill	1400	200
Pilchard, see Sardines		
Pineapple		
Canned in sirup	1	120
Frozen in sirup	1	38
Juice, unsweetened, canned	0.5	140
Raw	0.3	210
Plums		
Canned in sirup	18	110
Raw	0.6	170
Polyvitamin Dispersion, Mead's dry	6	10
Pomegranate, pulp and juice	0.3	200
Popcorn, popped		
Oiled	3	240
and salted	2000	240
Pork, lean, raw	58	260
salt	1800	27
Postum, cereal beverage, dry	36	1300
Instant, dry	71	2200
Potatoes		
Chips	340	880
Sweet, raw, less skin	4	530
Canned	48	200
White, raw, less skin	0.8	410
Canned	350	240
Poultry seasoning	26	840
Pretzels	1700	130
Protenum, dry	360	1100
Prunes		
Canned in sirup	3	220
Dried	6	660
Juice, unsweetened, bottled	2	260
Raw with skin	0.7	210
Pumpkin, canned	2	240
Raw, less rind and seeds	0.6	480
Quail, raw		
Breast meat	35	160
Leg meat	44	190
Quince, raw, less skin and core	0.7	290
Rabbit, domesticated, raw		
Foreleg	47	370
Loin	34	400
Radishes, with skin	9	260
Raisins, seedless	21	720
Zante (currants)	22	730
Ralston, Instant, dry	1	360
Raspberries, black	0.3	190
Oriental (wineberry)	0.9	170
Red	0.5	130
Rennet tablets, Junket	38,000	36
Rhubarb, raw	1	70
Frozen in sirup	2	160
Rice, dry		
Brown	9	150
Flakes	720	180
Polished and coated	2	130
Puffed	0.9	100
Vitaminized	4	170
Wild (Zizania)	7	220
Root beer	8	0.5
Royal Crown Cola	5	2
Rum	2	3
Rutabaga (yellow turnip), less skin and tops, raw	5	260
Ry-Krisp	1500	600
Sage	20	670
Salmon, raw	48	410
Canned	540	300
Salt, theoretical value for pure NaCl	39,342	0
Sardines		
Herring, canned in oil	510	560
Pilchard, canned in natural sauce	760	260
Canned in tomato sauce	400	320
Sauerkraut, canned	630	140
Sausage		
Bologna	1300	230
Frankfurt	1100	220
Pork	740	140
Scallops, frozen	150	420
Shortening, vegetable		
Crisco	4	0
Spry	0.4	0
Shrimp, raw	140	220
Sirup, chocolate, Hershey	60	130
Maple	14	130
Sorghum	21	600
Table, corn-and-cane, *Karo*, crystal white	68	4
Soda, baking, theoretical value for pure $NaHCO_3$	27,373	0

** Analyses made on edible portions of unprocessed foods except as otherwise designated.

*Food items.***	*Na* *mg.*	*K* *per cent*
Soft drinks		
Carbonated water		
Canada Dry	18	0.6
Made with *Sparklet* CO_2 capsule and distilled water	0	0
White Rock	1	0.6
Coca Cola	1	52
Ginger Ale	8	0.6
Lemon-lime soda	7	33
Orange Crush	2	100
Pepsi-Cola	15	3
Royal Crown Cola	5	2
Root beer	8	0.5
Sorghum sirup	21	600
Soup, canned, diluted as served		
Beef	410	100
Tomato	380	110
Vegetable	380	120
Soybeans, dry	4	1900
Flour, solvent extracted	1	1700
Spaghetti, see Macaroni		
Spinach		
Canned	320	260
Frozen	60	380
Raw	82	780
Spry	0.4	0.2
Squash, raw		
Acorn, less rind and seeds	0.4	260
Hubbard, less rind and seeds	0.3	240
White summer, less rind, with seeds	0.2	150
Yellow summer, less rind, with seeds	0.6	200
Squash, cooked, frozen	6	420
Starch, corn	4	4
Strawberries, raw	0.8	180
Frozen, sweetened	2	180
Sugar, light brown	24	230
White	0.3	0.5
Sweetbreads, see Pancreas and Thymus		
Tangerines		
Juice, sweetened, canned	0.6	170
Pulp and juice	2	110
Tapioca, dry	5	19
Tea, India-Ceylon-Java blend, dry	4	1800
Thyme	8	500
Thymus, beef, raw	96	360
Tobacco, chewing, *Spark Plug*	1600	1800
Tomatoes		
Canned	18	130
Catsup	1300	800
Juice, canned	230	230
Raw, with skin	3	230
Tongue, beef, raw	100	260
Tripe, pickled	46	19
Tuna, canned	800	240
Turkey, raw		
Breast meat	40	320
Leg meat	92	310
Turmeric	22	2700
Turnip, raw		
Leaves	10	440
White, less skin and top	37	230
Yellow (rutabaga), less skin and top	5	260
Vanilla extract	1	74
Veal, lean, raw	18	330
Vinegar, cider	1	100
Distilled	0.6	15
Walnuts, raw		
Black	3	460
English	2	450
Watermelon, pink meat	0.3	110
Wheat		
Beeswing (outermost coats)	4	360
Bran, crude	15	980
Flakes (cereal)	1300	320
Germ, crude	2	780
Malt-flavored, *Zing*	9	780
Puffed	4	340
Shredded	2	330
Winter, scoured 4 samples	2	370
Wheatena, cereal, dry	2	380
Whiskey, blended	0.3	1
Bonded	0.1	0.6
Wine, port	4	75
Sauterne	10	87
Wineberry (oriental raspberry)	0.9	170
Worcestershire sauce	2100	480
Yeast, compressed	4	360
Debittered, brewer's, dry	150	1700
Primary cultured, dry		
Maximum	520	2200
Minimum	9	1700
Average	115	1860
Zwieback	250	150

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